THE NEW INTERNATIONAL ENCYCLOPÆDIA

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

MUNICIPAL GOVERNMENT. The outstanding feature in municipal government from 1914 to 1924 was the rapid advance of the commission-manager plan, which was only fairly well started at the beginning of 1914. A rapid increase was made in numbers and population of incorporated places in the United States; their services, rendered at public expense, were continually augmented; and there was a consequent increase in municipal expenditures, indebtedness, and tax rates. All three increases were accelerated by the War and post-war conditions during the 10 years. No true picture of these increases can be gained without taking into account the diminished purchasing power *of the dollar and the greatly increased commodity* and construction cost index. Besides the movement of cities toward the adoption of the commission-manager city charter, other changes were made, to effect more efficient municipal government and at the same time to make it more responsive to the wishes of the people. Where the commission or the commission-manager plan, with its small governing body, had not been adopted, there were many changes to councils of much smaller size than formerly, with abolition also of the bicameral or two-chamber city council where that was still in existence. The most notable example was the substitution at Philadelphia on Jan. 1, 1920, of a single council of 21 members for the old double-chambered council of 144.

The census of 1920 showed that the 50 largest cities of the country had a population of nearly 38,000,000. The 50 largest cities of the United States in 1870 had a total population of 5,773,000, or only 153,000 more than the population of New York in 19[illegible]. In 1870 the United States had only 14 cities of 100,000 population or more, compared with 68 in 1920. Up to and including the census of 1870 the dividing line between urban and rural population was 8000. By 1880 urban life had become so much more intense that the urban classification was extended to embrace all incorporated places of 2500 population and over, and all towns of that size, in certain New England States. On this basis the urban population of the United States on Jan. 1, 1920, totaled 54,300,000, or 51.4 per cent of the entire population of the country; these people lived in 27[illegible] places. Smaller incorporated places, each functioning municipally to a greater or less degree, numbered 12,905 in 1920 and had a population about 9,000,000. For 1924 it is safe to assume some 16,000 incorporated places with a total population of about 65,000,000, or nearly 60 per cent that of the entire country. A preliminary statement by the Bureau of the Census reporting taxes collected in 1922 and 1912 shows that incorporated places of more than 2500 population collected a total of $1,532,000,000 taxes in 1922 against $850,000,000 in 1912, an increase of 80 per cent. The corresponding figures for taxes levied by counties are $745,000,000 and $308,000,000, an increase of 142 per cent. The net debt of cities (gross-debt sinking-fund assets) for all incorporated places in the United States was $4,709,000,000 *or $70.80 per capita in 1922, against* $2,885,000,000 or $54.07 per capita in 1912.

Charters and Municipal Home Rule. One by one the various State Legislatures of the Union have given up the early and long-prevailing practice of enacting separate charters for individual cities. In some places it is still within the power of a Legislature to do this, although the power is rarely exercised. A number of State constitutions prohibit all legislation applying to one city only. Some years ago New York State made such legislation subject to local veto by the mayor or in smaller places by the local legislative body. New York in 1914 and Massachusetts in 1915 passed optional charter acts under which municipalities can by popular vote choose between six types of charter in New York and four types in Massachusetts. The three main types in each State are the federal or mayor-and-council type, with varying degree of separation between legislative and executive functions; the commission plan, and the commission-manager plan. In 1915 the voters of New York State defeated municipal home-rule amendments to the State constitution which had been drawn by a constitutional convention. After persisting in an attempt to the same end, New York State in 1924 became the thirteenth in the Union to grant more or less extensive home-rule powers to its municipalities. The New York home-rule constitutional amendment was adopted by a popular majority of 426,000 at the November election in 1923. The necessary enabling act specifying the details of home-rule powers and methods of exercising them was passed by the Legislature of 1924 and ap-

proved by Governor Smith on April 24. The amendment added several sections to Article XII of the New York State constitution, which makes it the duty of the Legislature to provide for the government of municipalities.

The Enabling Act (Chapter 303, Laws of 1924) extends broadly to all kinds of strictly local legislation, including the making and amending of municipal charters, but leaves unaltered the power of the Legislature to pass certain kinds of laws applicable to all municipalities. The amendment also authorizes the Legislature to pass special legislation by a two-thirds concurrent vote of each house, on receipt of an emergency message from the Governor. Every city is granted constitutional "power to adopt and amend local laws not inconsistent with the constitution and laws of the State." These laws may relate to a wide range of subjects. The amendment makes it the duty of the Legislature to provide by general law for putting the amendment into effect. The Enabling Act authorizes any local legislative body to pass local acts superseding existing State legislation applying to the municipality in question alone The act makes compulsory a referendum vote on certain charter changes and local ordinances such as those changing the veto power of the Mayor, creating a new executive office, abolishing a branch of the legislative body, or alienating city property. Other kinds of local acts are subject to referendum on petition. Provision is made for local drafting of new charters. The municipal assembly is prohibited by the Enabling Act from passing any law removing or raising debt or tax limits and various other matters retained under State control. In the case of New York City and in recognition of the large legislative powers vested in the Board of Estimate and Apportionment, the Enabling Act gives the power to enact local laws to a bicameral body known as the Municipal Assembly, consisting of the Board of Estimate and Apportionment and the Board of Aldermen. Before they are approved by the Mayor, he must give a hearing on all local laws passed by the Assembly. The Mayor's veto of such laws may be reconsidered by the Municipal Assembly and passed over the veto by a two-thirds vote On reconsideration the Mayor is not allowed to vote. The New Jersey Legislature of 1923 granted to any municipality in that State the right to adopt the commission-manager form of city charter. A plain commission plan enabling act was passed some years earlier and had been widely adopted in the State, but repeated efforts to secure the manager plan were defeated.

CITY MANAGER CITIES

(From *The City Manager Magazine*, April, 1924.)

The following represents the growth of the manager plan by years.

Put in effect	By charter	By ord.	Total
1908	0	1	1
1912	1	2	3
1913	8	3	11
1914	15	6	21
1915	13	7	20
1916	15	5	20
1917	13	5	18
1918	20	8	28
1919	20	11	31
1920	23	12	35
1921	41	7	48
1922	28	10	38
1923	40	8	48
1924	6	1	7
1925	1	0	1
1926	1	0	1
Totals	245	86	331

Rapid Progress of City-Manager Plan. Up to 1914 the city-manager plan had been adopted by only 23 municipalities; the first of these was Staunton, Va., which created the office of business manager by ordinance in 1908 From 1915 on, there was first slow and steady and then more rapid progress in the adoption of the manager plan. The official *Year Book of the City Managers' Association* for 1924, revised to March 15, showed that 319 municipalities in the United States and Canada and 7 in foreign countries had adopted the manager plan. Of the 319 cities, 246 had adopted the plan by charter and 73 by ordinance. The charter method is considered the better of the two because it is more stable and rests on the referendum vote.

The population of cities operaing under the city-manager plan in 1924 was nearly 5,000,000 in the United States, 130,000in Canada and 470,000 in other countries. The largest American city under the plan was Cleveland, Ohio, with a 1920 population of 797,00. Other American manager cities with popultions in excess of 100,000 in 1920 were: Norfolk, Va., 159,000; Dayton, Ohio, 153,000; Grand Rapids, Mich., 137,000. By far the large number of manager cities are relatively small. The largest foreign city listed in the *Year Bok* already mentioned is Leeds, England, with a population about 430,000. The total number of manager cities given does not include those that have abandoned the plan. Of thes, there are altogether 76 that were reported as having adopted the plan, but of that numbe the reports were unfounded in many cases. Of the 76 cities, 72 either never really adopted the plan or else adopted and abandoned it uner ordinance. The plan has been abandoned by only 4 cities that adopted it under charter. he largest of these was Akron, Ohio, which adopted a manager plan not wholly as standard in 920 and gave it up four years later. The ther charter cities which abandoned the manager plan are Waltham, Mass., Hot Springs, Ark., nd Lawton, Okla.

Promotions of city managers have been common, with 72 instances. Up to Mar. 15, 1924, the *Year Book* already cited states that 259 managers were serving in their first cities, 30 in their second, 5 in their third, in their fourth, and one in his fifth. The over 13 of the 72 promotions were of men not now following the profession of city manager. The leading managers command high salaries, not always proportioned to the populson of the city. There were, however, many managers giving good service at modest salaries. In 14 cities the salaries paid to managers were $10,000 or over. Cleveland, Ohio, where the plan went into effect Jan. 1, 1924, pays $25,000 a year Norfolk, Va., and Stockton, Cal., pay $20,000; their respective populations in 1920 were 159,000 and 40,000 In the $15,000 class were Knoxville, Tenn., with a population of 78,000, and Sacramento, Cal., with a population of 66,000. Pasadena, Cal., and Lynchburg, Va., pay $12,000 a year. The cities in the $10,000 class were Long Beach, Cal.; Miami, Fla.; Dubuque, Iowa; Portland, Me.; Beaumont, Texas; Petersburg, Va.; and Bluefield, W. Va. The last named had the smallest population of any in the $10,000 class—16,000.

See CITY PLANNG, GARBAGE, MUNICIPAL OWNERSHIP, SEWERE, WATERWORKS.

MUNICIPAL LEAGUE, NATIONAL. An organization founded in 1894 for the study of municipal problems and the dissemination of information on the subjects relating to them. The society was active in the decade 1914–1924. Annual meetings are held in different cities. The twenty-first meeting was held in Dayton, Ohio, in 1915. During this year several important volumes were published, including *Lower Living Costs in Cities*, by Clyde L. King; *The City Manager*, by H. A. Toulmin, Jr. In 1916 the meeting was held in Springfield, Ohio. There was an important discussion on the influence of politics in city government. Lawson Purdy succeeded W. W. Foulke as president. The meeting in 1917 discussed many other subjects, including the experience of American and Canadian cities during war time. A survey commission to examine different phases of municipal government was appointed, as was also a Conference of State Leagues of Municipalities to act as a separate organization. Lawson Purdy was reëlected president. In this year the society published many other volumes, including *Municipal Functions*, by H. G. James. The session of 1918, held in New York City, gave the major part of its time to the discussion of various phases of Bolshevism. In November of the same year, a conference on reconstruction was held under the auspices of the society, in Rochester. In 1919 the meeting at Cleveland took the form of a moot constitutional convention, at which sundry questions on constitutional reform were discussed at length. Clinton Rogers Woodruff retired as secretary after twenty-five years of service. He was appointed honorary secretary. Hon. Charles E. Hughes was elected president at this meeting In Indianapolis, in 1920, the society discussed the report of a commission on State government. President Hughes delivered an address on the fate of the direct primary At this meeting the society voted to unite with the American Civic Association. H. W. Waite was elected president. A feature of the meeting in Philadelphia in 1922 was an address delivered by Albert Shaw on the history of the work of the society, entitled *A Thirty Years' View*. A committee on electoral reform was appointed at this session. At the meeting in Washington, in 1923, many phases of municipal government were discussed. Through its committee on State government it has prepared a Model State Constitution which was debated and accepted at three successive annual conventions. The constitution is published in pamphlet form with explanatory articles. The League has also prepared a number of pamphlets designed for classes in high schools, and many others on technical subjects. Its official organ is *The National Municipal Review*, monthly. The secretary is H. W. Dodds.

MUNICIPAL OWNERSHIP. Waterworks lead public utilities in percentage of plants under municipal ownership and even more markedly in percentage of population supplied. All of the 10 largest cities of the United States own their works. In the second group of 10 all but San Francisco and Indianapolis, and every one in the third group of ten, have them under public ownership. In cities ranging from thirty-first to fiftieth in population, all but six have municipally owned works. There are only nine examples of private ownership in the 50 largest cities of the country. In the second group of 50 cities, only six have them under private ownership. Out of the 100 largest cities, 15 had private-owned works. No figures for the whole country have been compiled since those given in the *McGraw Waterworks Directory* for 1915. Of 4400 works there listed for the United States, a number probably too small to include all works then built, 3045, or nearly 70 per cent, were municipally owned. For Canada, figures published by the Canadian Conservation Commission in 1915 showed that of 528 waterworks, 396, or about 75 per cent, were under municipal ownership. In some of the provinces, all of the works were publicly owned. Denver, Colo., after many years of effort and agitation to that end, acquired its waterworks from private owners in 1918. San Francisco, which had also been struggling for municipal ownership for a long time, had not succeeded up to 1924 in taking over the distribution system, but had completed what was formerly known as the Hetch Hetchy Dam and now called the O'Shaughnessy Dam, to form a large impounding reservoir on the Tuolumne River. It also had well under way the construction of a large aqueduct from the reservoir to the city. (See AQUEDUCTS and DAMS.) Extensive hydroelectric power development is a part of the project, and this is also true of the water supply brought to Los Angeles by a notable aqueduct. A notable event in 1923 was the transfer on December 15 to the city of Morristown, N. J., of the waterworks originally built in 1799 by the proprietors of the Morris Aqueduct. By this transfer there passed to municipal ownership the last of 15 privately owned waterworks in the United States built up to the close of the year 1800. On the date last named there was in existence only one municipally owned waterworks in the United States, at Winchester, Va.

Next to waterworks in public ownership in the United States stand electric light and power stations. A summary published in the *Electrical World* of Aug. 11, 1923, based on the 1923 edition of the *McGraw Central Station Directory*, shows that on Oct. 1, 1922, there were in the United States 5974 central station systems; of this number 2019, or 33.7 per cent, were municipally operated. The largest number of municipal central stations was reported from the west north central States, in which of 1460 stations, 693 were municipally operated.

Gas works in the United States make a very small showing for municipal ownership. According to figures compiled by the American Gas Association, based on the 1923 edition of Brown's *Directory of American Gas Companies*, of 966 gas works in the United States in 1923 only 51, or 5 per cent, were municipally owned, and the plants under municipal ownership supplied only 1.6 per cent of the total output of gas for the year to less than 2 per cent of the entire population supplied by gas; 662,000 population were supplied by municipally owned works out of a total of 45,000,000 people served. The 51 municipally owned gas works were located in 21 States, with six in Minnesota, five in Virginia, and four each in Georgia, Iowa, and Massachusetts. The largest of these was that supplying the Omaha metropolitan district in Nebraska; this was taken over by the district in 1920. The two next largest were at Richmond, Va., and Duluth, Minn.

Street railways are but rarely under munici-

pal ownership in the United States, but more commonly in Canada, and still more generally in Great Britain. In point of magnitude of works and capital investment, the subways and other railways forming part of the rapid transit system of New York City lead the country. These, however, are privately operated, and so are the municipally owned subways and elevated lines of Boston and Philadelphia. Important extensions to the New York and the Philadelphia rapid transit systems were still under way and projected in 1924. Within the preceding decade, San Francisco, Seattle, and Detroit went extensively into municipal ownership of street railways. San Francisco had either built or acquired by purchase over 60 miles of single track up to June 30, 1923. Seattle on Mar. 1, 1919, took over by purchase from the Puget Sound Traction Light and Power Company 203 miles of railway track at a purchase price of $15,000,000; this had been authorized by a popular vote of 4 to 1 in November, 1918. Detroit acquired an extensive street railway system.

In Canada, 15 municipalities have gone into municipal ownership of street railways. The entire street railway system of Toronto was under municipal ownership early in 1924 and some suburban lines also, although the latter were operated by the Ontario Hydro-electric Commission. Sewerage systems, though not usually regarded as a public utility, i.e. subject to private franchise and operation for private property, are owned by a few cities in the United States, the chief of which is Atlantic City; they are similarly owned in some foreign countries, as in the city of Valparaiso, Chile. The Public Ownership League of America, with national headquarters in Chicago, is devoted to the promotion of public ownership and democratic control of public utilities and natural resources and issues various bulletins on the subject.

MUNICIPAL TAXATION. See TAXATION IN THE UNITED STATES.

MUNITIONS OF WAR. See ORDNANCE.

MUNSEY, FRANK ANDREW (1854–1925). An American publisher (see VOL. XVI). During the decade 1914–24 he was especially active in the newspaper field and established and acquired by purchase several newspapers, including the Washington *Times*, Baltimore *News*, New York *Sun*, New York *Globe*, New York *Mail*, New York *Evening Telegram*, and New York *Herald*. The last he sold in 1924 to Ogden Reid, who consolidated it with the New York *Tribune*.

MURDOCK, VICTOR (1871–). An American legislator (see VOL. XVI). In 1917 he was appointed a member of the Federal Trade Commission. He was reappointed for the term expiring 1925. During the War he served as a member of the meat commission of the United States government. From 1914 to 1916 he was chairman of the Progressive national committee. He wrote *China, the Mysterious and Marvelous* (1920), and *Folks* (1921).

MURMANSK COAST EXPEDITION. See RUSSIA, *History*.

MURRAY, (GEORGE) GILBERT (AIMÉ) (1866–). A noted English philologist (see VOL. XVI). He has published since 1914 *Stoic Philosophy* (1915); *Faith, War and Policy* (1918); *Euripides and His Age* (1918); *Satanism and the World Orders* (1920), and *Problems of Foreign Policy* (1921).

MUSCLE SHOALS. A location on the Tennessee River 2.7 miles above the railway bridge at Florence, Ala., and a few miles from Sheffield. During the War the United States put under way a notable development there for the manufacture of nitrates for use in military explosives and also a large power plant involving the construction of a hundred-foot dam across the river. (See DAMS, *Wilson Dam.*) Under the terms of the National Defense Act of 1916 the site for the dam at this point was acquired, and in the following year United States Nitrate Plants No. 1 and No. 2 were planned, the latter directly at Muscle Shoals. This was done in order to secure an adequate supply of nitrate for the manufacture of munitions in case the United States should be cut off from the material imported from Chile. The reason for locating such plants at Muscle Shoals was the great power to be obtained from the Tennessee River, the fourth in size of the rivers of the United States, having a flow of 8000 to 500,000 cubic feet per second and in this vicinity a fall of over 134 feet in 37 miles. The Tennessee River is navigable from its mouth to the foot of Muscle Shoals, and the completion of the No. 2 or Wilson Dam at this point with its lock and the construction of No. 1 Dam, a small dam for navigation only two miles below the Wilson Dam, would extend navigation for a distance of 15 miles. The building of the proposed Dam No. 3, 50 feet high, would extend navigation 65 miles further and supply additional power Up to 1924 navigation of the river had been slight, but much interest centred in the development of power, particularly at Dam No. 2, the Wilson Dam Here for 12 months in the year there would be available 87,300 horse power and for 97 per cent of the time 100,000 horse power, while for 2½ months the available power would increase up to 600,000 horse power. The United States No 2 Nitrate Plant at Muscle Shoals was completed so that operation could begin on Oct. 27, 1918, and it continued for a sufficient time after the Armistice to show that it could be run successfully. It had a capacity of 220,000 tons of cyanamid or 110,000 tons of ammonium nitrate per annum. This plant was of course operated by steam power; there is a 60,000 kilowatt steam-power plant at Muscle Shoals. Electricity was supplied over a 90-mile transmission line from a 30,000 kilowatt steam plant on the Warrior River. The plant at Muscle Shoals cost approximately $70,000,000 and the Warrior River plant and transmission line about $5,000,000 additional. The raw materials required for nitrogen fixation were coke from the Birmingham district or eastern Tennessee, limestone from the Waco quarry, 30 miles distant, and nitrogen from the air. The principal item was the cost of power; 85,000 kilowatts was required, and the steam plants were used pending the completion of the large dam across the river. The No. 2 plant could supply the nitrogen for 12 infantry divisions at the rate it was used in the War, or more than one-third of the inorganic nitrogen used in the production of fertilizers in the United States at this time. Consequently in the latter connection after the end of the War the farmers became interested in the utilization of the plant as an agency to increase the supply and decrease the cost of fertilizer. Accordingly after the War the future of this great power and manufacturing development became a matter of considerable debate. After a curtailment of construction

work on the Wilson Dam in 1921, it was decided to proceed vigorously with its completion, but no decision was reached as to the method of utilizing the power that would be developed, up to the autumn of 1924. Offers were made by Henry Ford, the Combined Power Companies, in which the Alabama Power Company was a leading interest, a Mr. Hooker, and the Union Carbide Company, all of whom submitted to the government detailed proposals of plans for the utilization of the present and future power resources, the manufacturing of fertilizer, and the conditions under which it would be sold. The Ford proposal for a while attracted much public attention, but it was not altogether favorable to the government according to many engineers. The various schemes were all under discussion in 1923 and 1924, but the question of disposing of the government-owned property at Muscle Shoals was not definitely decided at the session of Congress ending June 7, 1924, although at that time the sentiment was rather in favor of the government's retaining and operating the property than of turning it over to Henry Ford to operate. There also were changes in the aspect of preparedness in this field as well as in the production and cost of fertilizer materials so that the conditions seemed to indicate that the power consideration might be preëminent over other considerations.

MUSIC. At the outbreak of the War, futurism was just making its appearance, and the majority of musicians, as well as music-lovers, then regarded the new movement as an aberration of taste not worthy of serious consideration. The decade 1914–24, however, witnessed such a rapid and general spread of the new cult that futurism was no longer to be ignored. To understand the situation at the close of this period it is necessary to distinguish between impressionism and futurism. Impressionism began as a reaction against the all-pervading influence of Wagner. For the fundamental principle of thematic development the impressionists substituted the mere statement of themes, which followed one another in kaleidoscopic succession, without systematic repetition or development. But the necessity of themes as basic material was still recognized. The conscious employment of the higher overtones, while extending the possibilities of harmonic combinations and progressions for the attainment of special effects, was carried to excess from the very beginning, with the result that impressionistic music rests not on the foundation of consonance, which was formerly the foundation of all music, but on dissonance. Around Debussy as their leader, a group of younger composers sprang up who soon made a caricature of impressionism and whose tendencies were dubbed futurism. These innovators, dispensing altogether with thematic invention, employed mere rhythmical figures. Regularly defined rhythm was soon scorned as monotonous, and constant variation of rhythm was adopted as a fundamental principle. Different instruments played different rhythms simultaneously, so that each instrumental part was entirely independent of all the others. This brought with it the complete and intentional disregard of the harmonic relations of sounds. The preponderant use of dissonance by the impressionists had already obliterated the dividing line between euphony and cacophony, and now the futurists denied the essential difference between consonance and dissonance, proclaiming a system of "free harmony" which permitted the combination and juxtaposition of all sounds, irrespective of relationship. This system frankly adopted cacophony as its basic principle. As compositions were no longer written in a recognizable tonality, key signatures disappeared and each accidental was marked individually, with the result that the printed page is as bewildering to the eye as the actual sounds to the ear. This method of writing soon became known as atonalism. However, some futurists insist on a distinction between atonalism, the negation of the diatonic scale and the triad, and polytonalism, the superposition or interlocking of various tonalities. Thus, in a string quartet by Casella the first violin plays in E♭ minor, the second violin in B♭ major, the viola in F♯ minor, and the 'cello in D minor. The constant change of rhythm quite naturally led to the abolition of time signatures and bar lines. The next step was the introduction of quarter-tones; the scores of Alois Hába were actually published in the new quarter-tone notation. The craze for novel effects also led to an abnormal augmentation of the mechanical means of sound-production. Orchestral instruments were exploited in unusual registers and in still more unusual combinations. As an extreme example of overloaded orchestration may be cited Schönberg's *Gurrelieder*, scored for 6 solo voices, 2 choruses of eight and 12 parts respectively, and 114 different orchestral parts—altogether 140 distinct parts! In the employment of this huge apparatus, Schönberg defeats his very purpose and produces less startling and grotesque effects than Stravinsky does in his *Histoire du Soldat*, scored for an absurdly inadequate orchestra of one violin, one clarinet, one bassoon, one cornet, one trombone, and several drums.

The outbreak of the War created conditions exceedingly favorable to the spread of futurism, especially in Europe. It happened that impressionism had already made great headway in Russia, England, and the Latin countries, whereas in Germany and Austria the traditions of the classic and romantic masters had proved an effective check against the new influence. With German music banished, or at least considerably curtailed, in all countries politically arrayed against Germany, the impressionists assumed undisputed leadership, and in their wake the futurists developed such an active campaign that in a very short time they succeeded to the dominating position. Debussy, who until the beginning of the War had been the acknowledged leader of the radicals or ultramodernists, was deposed as too conservative, and his place taken by the futurists Skriabin and Stravinsky. The futurists now became the ultramodernists, while the impressionists were relegated to the rank of mere modernists. In Germany and Austria the new gospel began to spread, and Schönberg, whose partisans before the War had made some futile attempts at recognition, suddenly found himself elevated to a place by the side of Skriabin and Stravinsky. As early as 1915 an Italian, Pratella, formulated the new futuristic creed: "Young composers, revolt against the tyranny of the publishers, the stupid presumption of the public, and the insipid gossip of critics all more or less bought. . . . Let us attack the prejudice for music that is well made, and despise that popular phrase, 'We must go back to older music.' . . . Let us destroy the

popular taste for old operas, whose exhumation encumbers the progress of new musicians. Let us compel the public, by assiduous propaganda, to be interested in all that teems with originality and revolution in music. . . . We hear on every side that we are fools. It is from the window of a glorious madhouse that we proclaim as an essential principle of our futuristic revolution that counterpoint and fugue, foolishly considered one of the most important branches of musical instruction, are no more in our sight than the ruins of the old science of polyphony that extends from the Flemish masters to Bach. . . . We declare, moreover, the values of consonance and dissonance as absolutely inconsistent. From innumerable combinations and from the diverse relations that result from them will arise the great futuristic melody. This melody will be simply the synthesis of harmony and in a way will resemble the ideal line formed by the continuous expanding of a thousand sea waves with irregular crests. . . . We have liked for a long time the enharmonic intervals produced by an orchestra that sounds out of tune in playing on diverse tonalities and that we hear in popular songs intoned without any knowledge of art. The rhythm of the dance will have to renounce the domain of polyphony for a free polyrhythmic manner. . . . The æsthetic intuition of the creative artist will be sufficient to balance the succession and alternation of all tempi and of all possible rhythms. . . . The musician ought to listen only to his soul singing in synthetic explanation of his musical ideas. . . . The purely symphonic composer writes at the pleasure of his fantasy, neglecting all principles and laws, to obey only the futuristic equilibrium. . . . We must be careful not to consider as absolute symphonic forms the traditional schemes of the symphony used to-day, which are decayed and surpassed. . . . We must express the musical soul of the multitude, of the great industrial factories, of trains, transatlantic steamers, warships, automobiles, and aëroplanes. We must add to the great dominant motifs of the musical poem the glorification of the machine and the victorious kingdom of electricity. . . . All this will become possible when conservatories, lyceums, and academies of music will finally be deserted and closed, and when the study of music will have taken the character of absolute liberty." This programme was accepted by most futurists, irrespective of nationality.

After the War the new movement continued throughout Europe with unabated vigor. A host of writers now appeared who effectively aided the composers, and in almost every country were established periodicals devoted exclusively to the cause of futurism. Through these persistent and systematic efforts a new public was recruited, sufficiently numerous to insure the success of a futuristic festival held in Salzburg in August, 1922. The immediate result of this festival was the formation of the International Society for Contemporary Music (I. S. C. M.), with headquarters in London, for the purpose of spreading the new cult by means of annual festivals. At the first official festival, which took place according to schedule at Salzburg in August, 1923, 35 composers of 14 different nationalities were represented on the programme.

On the older composers whose reputation had been firmly established early in the century, the War seems to have had a blighting effect. Strauss, Puccini, Elgar, and Sibelius were not silent, but they produced in the decade 1914–24 not a single work even remotely approaching the best of their earlier efforts. In fact, the beginning of their decadence antedated the outbreak of the War by several years. Different is the case of Rachmaninov, by all odds the greatest of living Russian composers, who suddenly, without having given any indication of declining power, deserted the career of the creative artist for that of the virtuoso. If these men of pronounced individuality, whose earlier works have permanently enriched the literature of music, were unable to stem the rising tide of futurism, it is vain to hope for any counteracting influence from men of lesser ability, who almost without exception exhibit some phase or other of futurism.

In the musical development of the United States during the decade futurism played a secondary rôle. Futuristic tendencies, it must be admitted, were quite noticeable among the younger American composers; but as yet, with the exception of Leo Ornstein, these manifestations avoided the furthest extremes and could still be regarded as advanced Impressionism. The chief reason why the influence of these composers on the public taste was negligible is the conservative attitude of the general public and of our great musical institutions, whose programmes, in the main, were still drawn from the works of recognized masters. While impressionists had frequent hearings, futurists were represented but sparingly, and only very rarely by extreme works. Of the musical centres, New York, the most important, is also the most conservative. Bach, Beethoven, Schubert, Brahms, Wagner, and Tchaikovsky still held undisputed sway, and despite determined efforts on the part of certain conductors, the New York public had not yet become convinced of the merits of Bruckner, Mahler, or Reger. This state of affairs led a small group of futurists to establish, in 1921, the International Composers' Guild for the purpose of producing exclusively works of extreme tendencies, because "the standard symphony orchestras present only the most timid and anæmic of contemporary productions, leaving absolutely unheard the composers who represent the true spirit of our time." In spite of very active and noisy propaganda this group made few converts, and the works produced at their special concerts did not find their way to the programmes of our recognized institutions. Although since the beginning of the century there had arisen in all parts of the United States numerous composers whose efforts had been duly recognized and encouraged by the leading orchestras and choral societies, they had not succeeded in reaching their common goal, the creation of a national school of music that should be recognized as typically American. Numerous and earnest attempts to force such a consummation by means of prizes, competitions, and special organizations producing exclusively works of native composers had not yielded the expected results. Nevertheless, the efforts put forth by this generation of composers were by no means futile; they were preparing the soil from which, at some future day, will spring the longed-for national art. Until the outbreak of the War, Berlin had been the centre of the world's musical

activity. American artists seldom risked appearances in their own country unless they had met with approval in a Berlin début. In this respect a complete change took place within the decade, so that a New York début had come to be a passport not only for American artists, but also for many a European aspirant. As a natural consequence of the War a vast number of the world's most famous interpretative artists sought and found success in extended tours of the United States The presence of so many celebrities at the same time compelled managers to extend the field of operation, so that even smaller towns were visited, with the result that interest was stimulated throughout the country. Tangible proof of this new interest is found in the large number of newly established musical organizations of all kinds in towns which had formerly never considered such institutions a necessity.

Chamber Music. The widespread interest in chamber music throughout the United States during the decade furnishes conclusive evidence of the steadily growing appreciation of the best music. In all parts of the country numerous new organizations not only had been formed but also successfully maintained themselves. The most notable event was the establishment of the annual Berkshire Festival, which was inaugurated Sept. 16–18, 1918. During the summer of 1917 Mrs F. S Coolidge began the erection on South Mountain, near Pittsfield, Mass., of the Temple of Music, a small concert-hall with a seating capacity of 500, to be devoted exclusively to the performance of chamber music. At the same time she offered a prize of $1000 for the best string quartet to be performed at the inaugural festival Not less than 82 manuscripts, many from European composers, were submitted. After the success of the first festival the $1000 prize was made a regular feature. The programmes of the festivals are given by famous chamber music organizations from all parts of the Union. On two occasions European quartets participated, the London String Quartet (1920) and the Stuttgarter Streichquartett (1922). The programmes offered were remarkable for variety and catholicity of taste, favoring no nation and no period, and ranging from Bach to the moderns of the day. At the conclusion of the festival of 1922 announcement was made that the cash prize thereafter would be awarded biennially, in the even years. In the odd years new works were to be commissioned from prominent composers. The first composers to be honored with such commissions were Eugene Goossens (string sextet) and Rebecca Clarke (*Rhapsody* for 'cello and piano), both performed at the festival of 1923. The list of prize winners was as follows: 1918, Tadeus Iarecki, string quartet; 1919, Ernest Bloch, suite for viola and piano; 1920, Francesco Malipiero, string quartet; 1921, H. Waldo Warner, piano trio; 1922, Leo Weiner, string quartet; 1924, Wallingford Riegger, *La Belle Dame Sans Merci*, for vocal quartet and chamber orchestra. An event that should not pass unrecorded is the dissolution of the famous Kneisel Quartet, which played its last concerts at Boston (Mar. 13, 1917) and New York (April 3). Founded in 1886, with Franz Kneisel, Otto Roth, Louis Svecenski, and Fritz Giese as its original members, it played 32 consecutive seasons in Boston and 25 in New York, besides making numerous tours of the United States and two of Europe. Its influence in practically creating and then cultivating taste for chamber music in America can scarcely be overestimated. For many years it had enjoyed the reputation of one of the finest quartets in the world.

Community Music. Community music, at least as the term had come to be understood, was a direct result of the War. Previously there had existed, especially in Philadelphia and Chicago, isolated associations of factory workers organized into choral societies, some of which had attained sufficient proficency to appear in public concerts. During the War the soldiers, under regular leaders, were trained in choral singing, and this practice developed a genuine liking for music. Many ex-soldiers, after return to civil life, communicated the enthusiasm aroused in them by the camp songs to their fellow workers, with the result that in an incredibly short time employees of the larger companies in many industrial centres banded together for the cultivation of singing. Community choruses sprang up even in the smaller towns and villages throughout the country. The interest in music was not confined to singing; it immediately embraced the field of instrumental music, and numerous amateur orchestras and bands were established. By the end of 1920 the Bethlehem steel workers had recruited from among their own numbers not only a large chorus but also a complete symphony orchestra of almost 100 players. In the same year the employees of the Federal Reserve Bank in New York gave a complete stage performance of *The Bohemian Girl* without the assistance of an outsider even in the principal rôles or orchestra. In some of the larger cities, where musical appreciation naturally had been spread before the War, the new movement led to the establishment of community opera (Washington, Philadelphia, St. Louis, Cincinnati). In 1920 New York celebrated its first Music Week (February 1–7), when all musical organizations, churches, hotels, theatres, and many individuals combined to bring music in some form or other home to everybody. At the Grand Central Palace an exhibition of musical instruments was held throughout the entire week, with lectures and recitals. The interest aroused was so general that Music Week was made a regular annual institution, and a permanent committee of eminent musicians was appointed. The example was followed immediately by almost all neighboring communities, who had their Music Week before the end of the year. Within three years the idea had been adopted by the entire country. This widespread interest in music induced several municipalities to appropriate public funds for furthering various musical projects. Baltimore established a special department of Municipal Music, St. Louis a municipally subventioned summer opera, Chicago and Philadelphia municipal symphony orchestras, etc. In New York a movement was on foot in 1924 for the erection of a municipal conservatory, and the Musical Alliance of the United States had launched a movement for the establishment of a ministry of fine arts and a national conservatory in Washington.

Festivals. After the sudden interruption of the performances in the summer of 1914, the theatre dedicated to Wagner in Bayreuth remained closed for 10 years. During 1923 Sieg-

fried Wagner gave concerts in many German cities, raising funds for the restoration of the theatre and the resumption of the performances. For the same purpose he made a concert tour of the United States early in 1924. In the summer of 1924 the festival was resumed (July 22–August 20) with performances of the *Ring* dramas, *Meistersinger*, and *Parsifal*. After 1914 the chorus of the Bethlehem (Pa.) Bach Festivals was gradually augmented, until in 1924 it numbered 250. Up to 1920 the programmes had been selected exclusively from the choral works of Bach, but in that year instrumental works were included. The innovation was received with favor and was adopted as a fixed policy. In 1917 the chorus participated in a Bach-Beethoven festival in New York arranged by the Philharmonic Society, and in the following year in a Bach-Wagner festival of the Symphony Society.

Albert A. Stanley, conductor of the Ann Arbor festivals since their inception (1893), resigned in 1921 and was succeeded by Earle V. Moore. An annual festival lasting four days was founded in Newark in 1915 by Mortimer C. Wiske and conducted by him thereafter. At the North Shore Festival in Evanston, Ill., a prize of $1000 was established in 1921. It was to be awarded annually for the best orchestral score submitted by an American composer, the successful work to have its first performance at the festival and then to be included in one of the regular concerts of the Chicago Symphony Orchestra during the following winter. The winners were Camille Zeckwer with *Jade Butterflies* (1922), Felix Borowski with *Youth* (1923), and Charles M. Loeffler with *Memories of Childhood* (1924). For the first time in its history, the annual festival at Worcester, Mass., was omitted in 1918, on account of an epidemic of influenza that swept the eastern States in the fall of that year. There was no festival in 1922, because the time was permanently changed from September to April. Arthur Mees resigned as conductor in 1919, and was succeeded by Nelson P. Coffin, who died shortly before the festival of 1923. The latter was under the direction of Arthur J. Bassett and J. Vernon Butler. In 1924 Henry Hadley was elected regular conductor.

Mechanical Reproduction of Music. There is not the least doubt of the fact that the introduction and rapid perfection of the player-piano and phonograph contributed in a large measure to the development of the public taste for better music. The former had been brought practically to perfection even before the War. This is true of the Welte-Mignon Duo-Art and Ampico reproducing pianos, which differ from player-pianos in that they faithfully reproduce that subtle quality termed the individuality of the artist. On Dec. 10, 1918, the Chicago Symphony Orchestra performed Saint-Saëns's concerto in G minor for piano and orchestra with Harold Bauer as soloist. The latter, however, was not actually present, but was represented by his Duo-Art record. At a concert of the New York Philharmonic Society (Apr. 23, 1919), the soloist, Leo Ornstein, sat motionless on the stage listening to his own reproduction of the first movement of Mendelssohn's Concerto in G minor, after which he took his seat at the instrument and played the remaining movements in person. In records for the phonograph, the decade witnessed a tremendous improvement. It may be said that up to 1914 satisfactory records had been made only of solo voices or solo instruments. The accompaniment, whether for piano or orchestra, left much to be desired in regard to clearness and proper balance with the solo part. Reproductions of choruses sounded blurred, while orchestral records failed to reproduce the timbre of the different instruments. Especially wonderful was the progress made since then in the reproduction of orchestral masses, so that in the best records a practiced ear can detect such subtle differences in timbre as between an oboe and an English horn. Almost all the great symphony orchestras had played for the recording companies. One great problem, however, still remained for the manufacturers to solve. So far no one had succeeded in reproducing the real, resonant tone of the piano; even the best records sounded as if the artists were playing on a harpischord or a harp.

Almost from the day of its inception broadcasting by radio became an important factor in the dissemination of good music. The first concert heard over the radio was broadcast by Station KDKA in Pittsburgh, on Nov. 3, 1920, and soon stations all over the country were broadcasting music. The beginning was made with dance music and popular songs of the day, but before long, in response to numerous requests, symphony concerts and entire operatic performances were broadcast. The demand for the better music rapidly assumed such proportions that managers, especially those of famous artists, fearing a decrease of attendance at concerts, inserted a clause in all contracts restraining their artists from giving their services gratis. Composers and publishers also began to demand payment of the usual fees on all works controlled by them. These demands the radio companies declared themselves unable to meet, as they derived no income whatever from the host of listeners The result was that during the last months of 1923 there was a decided dearth of good music transmitted by radio. However, frequent conferences of representatives of the American Telephone and Telegraph Company (Station WEAF, New York) and of managers and musicians finally resulted in the appointment of a committee who issued a general appeal for voluntary contributions from interested listeners. The public responded quickly and generously. With a considerable fund at hand a plan was worked out for the broadcasting of concerts of famous stars, beginning with the opening of the concert season in the fall of 1924.

Opera. The history of opera during the decade is a record of almost feverish activity barren of any artistic results. Of the enormous number of new works produced in all the opera houses of the world, especially after the Armistice, not one achieved an emphatic and general success promising an addition to what may be termed the standard operatic repertoire. The vast majority of these novelties did not even outlive the year of their original production. Of the two foremost living dramatic composers, Puccini brought out *La Rondine* (1917) and the triptych *Il Tabarro, Suor Angelica, Gianni Schicchi* (1918); Strauss, a revised version of *Ariadne auf Naxos* (1916) and *Die Frau ohne Schatten* (1919), winning in each case only a *succès d'estime*. To the already formidable list of his failures Mascagni added *Lodoletta* (1917)

and *Il Piccolo Marat* (1921). The more prominent among the composers whose works survived for several seasons and were heard in more than one city were d'Albert, with *Die Toten Augen* (1916; in the United States, 1923), *Die Revolutionshochzeit* (1919), *Sirocco* (1921), and *Mariecken von Nymwegen* (1923); Pfitzner, *Palestrina* (1917); Schillings, *Mona Lisa* (1915; in the United States, 1923), Zandonai, *La Via della Finestra* (1919) and *Giulietta e Romeo* (1922). On May 1, 1924, the much heralded and long delayed première of Boito's *Nerone* actually took place at La Scala, in Milan What had excited international interest in this event was the fact that for the last 25 years there had been constant reports of all kinds regarding this work, of which no one, not even the composer's intimate friends, had seen or heard a note. Expectation had been raised so high that nothing less than a masterpiece of Wagnerian power could have survived the ordeal. The consensus of critical opinion was that the première was a "magnificent failure." In spite of the fact that in the United States opera received a large share of public attention, New York and Chicago were still the only cities supporting a permanent operatic institution Other cities were dependent on short visits from traveling companies, some of which, especially the San Carlo Opera Company and the Society of American Singers, were notable for the excellence of their ensemble. The taste of the general public showed a decided preference for the standard works, so that the production of novelties was left almost exclusively to the two permanent organizations. Neither of these institutions was fortunate with new works; not one of their novelties maintained itself in the repertoire. The fiasco of the only futuristic opera attempted so far, Prokofiev's *Love for Three Oranges*, by the Chicago company (1921), was such as to deter American managers from further experiments in this line, at least in the immediate future.

Chicago Opera Association. After the death of the general manager, Cleofonte Campanini (1919), his duties were divided between H. M. Johnson and Gino Marinuzzi, as executive and artistic director respectively. Complications arising from this dual directorship led, early in 1921, to the appointment of Mary Garden as sole director. Under her management the friction became even more acute, and a deficit of $800,000 at the end of the season brought about the dissolution of the company (1922), after 12 years of splendid artistic achievement. Immediately the Chicago Civic Opera Company, with Samuel Insull as president, was organized and acquired all the properties and practically the entire personnel of its predecessor. While there was no change in regard to artistic policies, a radical departure in administration was inaugurated by vesting the executive power in the finance committee rather than in a single individual. Giorgio Polacco was made artistic director.

During the War the works of Wagner had been excluded from the repertoire. In 1920 *Lohengrin* was restored, in an English version, and was followed by *Die Walkure* (1921). After that, these and other works were sung again in the original German. During 1918–22 the regular season included a four weeks' visit to New York. The year 1922 is memorable for a transcontinental tour (January–April), which was as brilliant artistically as it proved disastrous financially. Three operas by foreign composers had their world première in Chicago: Lazzari's *Le Sauteriot* (1918), Février's *Gismonda* (1919), and Prokofiev's *Love for Three Oranges* (1921). Native composers were encouraged by the production of Buchhalter's *A Lover's Knot* (1916), Hadley's *Azora* (1917), Nevin's *The Daughter of the Forest* (1918), De Koven's *Rip Van Winkle* (1920), and Stearns's *The Snow Bird* (1923). Two ballets by American composers were given in 1919, Borowski's *Boudour* and Carpenter's *The Birthday of the Infanta*. The following foreign works were given for the first time in the United States: Gnecchi's *Cassandra* (1914); Saint-Saëns's *Déjanire* (1915); Massenet's *Cléopâtre* (1916); Gunsbourg's *Le Vieil Aigle* (1917); Catalini's *Lorelcy* and Montemezzi's *La Nave* (1919); Ravel's *l'Heure Espagnole*, Messager's *Madame Chrysanthème*, Erlanger's *Aphrodite*, Marinuzzi's *Jacquerie* and Leoncavallo's *Edipo Rè* (1920)

Metropolitan Opera House (New York). The decade at the Metropolitan Opera House, under Giulio Gatti-Casazza as general manager, was a period of unexampled prosperity. There was no annual deficit to be met. Year by year the number of subscribers increased. No promises were made that were not strictly fulfilled. During the period of the War the works of Wagner and Strauss were temporarily withdrawn, but, beginning in 1920, they were restored, one after the other, to the repertoire. The policy of producing every season a work by an American composer, inaugurated in 1910, was maintained until 1920, except for the years 1915 and 1916. Thus the following operas were brought out: De Koven, *The Canterbury Pilgrims* (1917); Cadman, *Shanewis* (1918); Breil, *The Legend*, and Hugo, *The Temple Dancer* (1919); Hadley, *Cleopatra's Night* (1920). A ballet by an American, Gilbert's *The Dance in Place Congo*, was performed in 1918. Four world premières of works by foreign composers are to be recorded: Giordano, *Madame Sans Gêne* (1915); Granados, *Goyescas* (1916); Puccini, *Il Tabarro, Suor Angelica*, and *Gianni Schicchi* (1918); Wolff, *l'Oiseau Bleu* (1919). Following are the foreign operas given their American premières: Montemezzi's *L'Amore dei tre Rè*, Charpentier's *Julien*, and Wolf-Ferrari's *L'Amore Medico* (1914); Leoni's *L'Oracolo* and Borodin's *Prince Igor* (1915); Bizet's *Les Pêcheurs des Perles*, Gluck's *Iphigenie auf Tauris*, and Zandonai's *Francesca da Rimini* (1916); Rabaud's *Marouf* (1917); Liszt's *The Legend of St Elizabeth* and Mascagni's *Lodoletta* (1918); Leroux's *La Reine Fiammette* (1919); Leoncavallo's *Zaza* and Tchaikovsky's *Eugen Oniegin* (1920); Weiss's *The Polish Jew* and Korngold's *Die tote Stadt* (1921); Mozart's *Così Fan Tutte* (1922); Vittadini's *Anima Allegra* and Schillings's *Mona Lisa* (1923); Riccitelli's *Compagnacci* (1924). The following operas, produced by other organizations than the Chicago and Metropolitan companies, complete the list of American premières during the decade: 1914, Mozart's *Bastien et Bastienne* (New York); 1915, Parker's *Fairyland* (Los Angeles); 1916, Moniuszko's *Verbum Nobile* (Philadelphia) and Mozart's *The Impresario* (New York); 1917, Donizetti's *Campanella di Notte*, Pergolesi's *La Serva Padrona*, Gounod's *Le Médecin malgré Lui* (all in New

York); 1918, Hadley's *Bianca* (New York); 1919, Vives's *Maruxa* and *Los Bohemios* and Messager's *Monsieur Beaucaire* (both in New York); 1922, Dargomyzhsky's *Russalka* and Rimsky-Korsakov's *Tsarskaya Neviesta* (San Francisco); 1923, Moniuszko's *Halka*, d'Albert's *Die Toten Augen*, and Kienzl's *Der Evangelimann* (all in Chicago).

Oratorio. The steady decline of public interest in oratoria, which began long before the close of the last century, went on unchecked after 1914, with the result that the few works written in this form were produced by serious musicians mostly little known to the public Even the masterpieces of Händel, Haydn, and Mendelssohn were heard less and less frequently.

Orchestras. While in the United States the opera formerly engaged the principal interest of the general public, the decade 1914–24 wrought a change in favor of orchestral music. All the older organizations vastly increased the number of their concerts, so that the orchestral season extended from October to May. In 1914 the Boston Symphony Orchestra had no rival in this country. Even then it was no secret that the perfection of its ensemble was due to daily rehearsing. Unfortunately no other orchestra at that time had a patron like Colonel Higginson who would bear the enormous expense involved The longer musical season provided the natural solution of the problem, so that in 1924 we could boast not one but several premier orchestras unsurpassed anywhere in the world. Daily rehearsals had produced the identical result in all cases Visits of orchestras to other cities and exchange of conductors had engendered a spirit of rivalry which makes for supreme efficiency The soloist, formerly an indispensable attraction at every symphony concert, had come to occupy a secondary position. In 1912 the Boston Symphony Orchestra, under Dr. Muck, made the first successful experiment in giving concerts without the aid of soloists. From that time the practice became so common, that in 1924 soloists were engaged for perhaps not more than half the season's concerts. This widespread and intelligent interest in the music itself, rather than in the executant, had created a new, collective method of subventioning orchestras. The cost of maintaining a first-class organization is so heavy that the income from admissions is in every case insufficient to meet expenses. The burden of the inevitable annual deficit, formerly borne by some wealthy patron especially interested (e.g., Higginson, Carnegie, Flagler), was being assumed by several guarantors, each contributing a relatively small amount In the latter years more than one of our premier orchestras was threatened with dissolution because of inability to meet the high cost of maintenance. In every case a sufficient number of public spirited citizens came forward to avert a serious loss to the community And when one considers that from the conclusion of the War every year new symphony orchestras were established throughout the country, he cannot but be impressed with the development of public taste during the decade

Boston Symphony Orchestra. The refusal of Dr Muck, in the fall of 1917, to play the national anthem before the concert, was the beginning of a period of storm and stress. He resigned at the end of the season. At the same time Colonel Higginson severed his relations with the orchestra, delegating his powers and responsibilities to a board of nine directors. More than 20 German players, who had failed to take out naturalization papers, were dismissed. In 1918–19 Henri Rabaud was the conductor; under him the orchestra rapidly deteriorated. When Pierre Monteux, in the fall of 1919, assumed control, he found a demoralized body of men, many of whom rebelled and deserted before the end of the season, so that out of a total of 100 performers only 67 remained for the final concerts. In addition, a deficit of $131,000 brought the organization to the verge of dissolution (April, 1920). An appeal by the directors secured not only this amount but also a guarantee fund, pledged by 200 contributors, for five years. With a thoroughly reorganized and practically new orchestra Monteux began the difficult task of regaining the lost prestige When Sergei Kussevitsky became conductor, in 1924, he found that his predecessor's efforts had been crowned with success

Chicago Symphony Orchestra. In 1914 a pension fund was established through the gift of $100,000 by Mrs. E. S. Coolidge, who donated the same amount also the next year. In 1923 Clyde M. Carr bequeathed to the organization $1,000,000 to be used at the discretion of the trustees. In the spring of 1923 a number of music lovers saved the orchestra from disbanding by assuming responsibility for a considerable increase in the salary of the men demanded by the musical union

Cincinnati Symphony Orchestra. After the internment of the conductor, Dr. Kunwald (January, 1918), the remaining concerts of the season were given under guest conductors In 1918–22 Eugène Ysaye was conductor. His successor was Fritz Reiner

Minneapolis Symphony Orchestra. In 1922 Max Oberhoffer resigned and was succeeded by Henri Verbrugghen. At the same time the orchestra widened its field of activity by adding a series of 16 concerts in St. Paul, a series of 25 popular Sunday concerts and 5 educational concerts for young people

National Symphony Orchestra. This organization was founded in New York in 1919 as the New Symphony Orchestra, under Edgar Varèse, for the exclusive production of futuristic works. The complete failure of the first concert (April 11) so alarmed the guarantors that they dismissed Varèse and engaged Bodanzky, who played only standard works at the remaining concerts. His success led to the incorporation of the orchestra as the National Symphony Orchestra, beginning its career in October, 1919 In the summer of 1920 it was engaged for the series of open-air concerts at the Stadium of the College of the City of New York, under Walter Rothwell as guest conductor. As Bodanzky's duties at the Metropolitan Opera House did not allow him sufficient time, the directors engaged Mengelberg for the second half of the season (January–March, 1921) He made a sensational success and remained with the organization after its amalgamation with the Philharmonic Society.

New York Philharmonic Society. The amalgamation of the society with the National Symphony Orchestra in 1921 led to a complete reorganization Many of the older men were retired on pension, the personnel was increased to 125 performers, and a new schedule for in-

tensive rehearsals was adopted. Mengelberg was engaged as coördinate conductor with Stransky, the former directing the last half of the season, the latter the first half. In 1923 Stransky resigned and was succeeded by Willem Van Hoogstraten. From 1916–20 William Humiston was associate conductor; after those years the position was filled by Henry Hadley. During the summer of 1922 the entire orchestra was engaged for the open-air concerts at the Stadium; the first half of the series was led by Hadley; the second, by Van Hoogstraten In 1923 Van Hoogstraten was conductor of the entire series. With the proceeds of two festival concerts celebrating the eightieth anniversary of the foundation of the Society (April, 1922) a benefit fund was established for the members.

New York Symphony Orchestra. Under its regular conductor, Walter Damrosch, the orchestra made a most successful tour of France, Italy, Belgium, and England in May and June, 1920 In 1921 and 1922 Albert Coates directed several concerts as guest conductor. Bruno Walter appeared in the same capacity in 1923–24, and Vladimir Golschmann in 1924.

Philadelphia Symphony Orchestra. In 1916 Edward Bok donated to the orchestra $250,000 and pledged himself to pay any deficit for the next five years. In 1918 a regular series of five concerts in New York was established, the number of which was increased to 10 in 1921. During the absence of Leopold Stokowski as guest conductor in Paris, in 1923, his place was taken by Georges Enesco.

St. Louis Symphony Orchestra. After the death of Max Zach, in 1921, the remaining concerts of the season were led by guest conductors. From the fall of 1921 Rudolf Ganz was regular conductor

Following is a list of the more important new symphony orchestras established during the decade. 1914: Detroit S. O., Weston Gales 1914–18, then Ossip Gabrilówitsch; 1916: Baltimore S. O, Gustav Strube; 1918: Cleveland S. O., Nikolai Sokolov; 1919· Los Angeles Philh. O., Walter Rothwell; 1920: Nashville S. O., F. A. Henkel; Toledo S. O., Lewis Clement; 1921: Erie S. O., Henry Vincent, Buffalo S. O, Arnold Cornelissen; 1922· Syracuse S. O., William Berwald; Watertown S. O, Patrick Conway, Salt Lake City Philh. O., Charles Shepard; Wichita S. O, P H. Flath, 1923: State S O. (New York), Josef Stransky; Rochester Philh. O., Eugene Goossens and Albert Coates as guest conductors; Civic S. O. of Philadelphia, Vassili Leps; Atlantic City Philh. Soc., Louis Colmans; American National O. (New York), Howard Barlow.

MUSICAL RECORDS. See MUSIC, *Mechanical Reproduction.*

MUSIC WEEK. See MUSIC, *Community Music.*

MUSSOLINI, BENITO (1884–). An Italian statesman, founder of the Fascisti. He was born at Predappio-Forli and educated at the Salesian College in Faenza and the University of Lausanne (Switzerland). When he began his career he was a Marxian socialist and was expelled from Switzerland and also from Austria on account of his views. He returned to his birthplace and there started *Lotta di Classe* and later became the editor of the *Avanti.* He was also a director of the Italian Communist party. At the outbreak of the War in 1914, he took the side of the Allies and urged that Italy enter the conflict against Germany. He was expelled from the Socialist party and at once started a new paper, the famous *Popolo d'Italia.* Fighting in the War as a corporal in the infantry, he was wounded, decorated, and discharged. Later he returned to his editorial desk. In 1919, when the wave of communism swept over Italy and the government at Rome seemed unable to combat the disorder prevalent in the country, Mussolini raged against the traitors who were ruining Italy; on Mar 23, 1919, he founded the first "Fascio di Combattimento," which was later to be known collectively as the Fascisti, from the Roman *fasces.* Officers and soldiers rallied to his support, and by 1922 there were about 4,000,000 Fascisti in Italy. Civil war raged during 1922 between the Fascisti and the Communists. Mussolini's legions reopened factories, stopped strikes, and broke up trade unions. By August the power of communism was broken In October, 1922, Mussolini declared he would take the government by force if it were not given to him willingly. On Oct 30, 1922, the King made him prime minister. He made drastic reforms during 1923, and in the April elections of 1924 the Fascisti received 65 per cent of the votes cast. See FASCISM and ITALY.

MUTATION THEORY. See ZOÖLOGY.

MUZZEY, DAVID SAVILLE (1870–). An American historian and author, born at Lexington, Mass., and educated at Harvard University, Union Theological Seminary, New York and Columbia Universities, and in Berlin and Paris. After serving as tutor in mathematics at Robert College in Constantinople for one year, he became a teacher of Latin and Greek in the Ethical Culture School of New York. In 1905 he was appointed head of the department of history at Barnard College and was successively associate, associate professor, and professor; the last office he assumed in 1920. He was a member of several learned societies and wrote *Rise of the New Testament* (1900); *Spiritual Heroes* (1902); *Beginners' Latin Book* (1907); *American History* (1911); *State, Church, and School in France* (1911); *Life of Thomas Jefferson* (1918); and *The United States of America* (1922).

MYCENÆ. See ARCHÆOLOGY.

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NANSEN, FRIDTJOF (1861–). A Norwegian Arctic explorer (see VOL. XVI). He was active during the War and was chairman of the Norwegian Association for the Nations in 1918. In the following year he proposed to the Allies the formation of a central commission for the supply of food to Russia. This was rejected by the Bolshevist government, which would not agree to the Allies' conditions that hostilities should first cease. He was asked by the Council of the League of Nations in 1920 to investigate problems in connection with the repatriation of prisoners of war; on this subject he prepared an exhaustive report. From 1920 to 1923 he had general charge of the direction of relief for Russian refugees. He published *Through Siberia* in 1914.

NAPHTHA. See PETROLEUM.

NASHVILLE. The capital of Tennessee. The population rose from 110,364 in 1910 to 118,342 in 1920, and to 121,128, by estimate of the Bureau of the Census for 1923. The city changed its form of government to the commission-manager plan in 1918. A nine-hole municipal golf course was constructed in 1923. In 1924 the city, in coöperation with Davidson County and the State of Tennessee, was engaged in building, at a cost of $2,225,000, a memorial to the soldiers in the late War, which occupied two blocks in the centre of the city and was to contain an auditorium seating 2500 persons. A temporary replica of the Parthenon which had been built some years previously, was reconstructed in more permanent form during the decade.

NATAL PROVINCE. See SOUTH AFRICA, UNION OF.

NATHAN, GEORGE JEAN (1882–). An American author and dramatic critic, born in Fort Wayne, Ind., and educated at Cornell University and the University of Bologna, Italy. From 1905 he has been connected with various newspapers He was dramatic critic, with Huneker, of *Puck* (1915–16), and of the *Smart Set Magazine* (1908–23). During 1914–23 he was editor of *Smart Set* with H. L. Mencken, and in 1924 he started with Mencken a new magazine, *The American Mercury*. His knowledge of the French, German, and English stage, and his keen observation, perspicacity, and discriminating sense of humor, have made him one of the leaders in criticism in the United States Some of his books are *The Eternal Mystery* (1913); *Another Book on the Theatre* (1916); *Bottoms Up* (1917); *Mr. George Jean Nathan Presents* (1917); *A Book Without a Title* (1918); *The Popular Theatre* (1918); *Comedians All* (1919); *Heliogabolus*, with H. L. Mencken (1920); *The American Credo*, with H. L. Mencken (1920); *The Theatre, the Drama, the Girls* (1921); *The Critic and the Drama* (1922).

NATHAN, ROBERT (1894–). An American author, born in New York City. He was educated in private schools in the United States and Switzerland and took graduate courses at Harvard. His published writings include *Peter Kindred* (1919); *Autumn* (1920); *Youth Grows Old* (1922); and *The Puppet Master* (1923) He also composed songs and a sonata for the violin.

NATIONAL AËRONAUTIC FEDERATION. See AËRONAUTICS

NATIONAL ARMY. See ARMIES AND ARMY ORGANIZATION.

NATIONAL CATHOLIC WELFARE COUNCIL. See ROMAN CATHOLIC CHURCH

NATIONAL CONFERENCE ON UNIFORM STATE LAW. See LAW, PROGRESS OF THE.

NATIONAL DEFENSE ACTS. See ARMIES AND ARMY ORGANIZATION

NATIONAL FORESTS. See FORESTRY.

NATIONAL GUARD. See ARMIES AND ARMY ORGANIZATION.

NATIONALIST TURKS. See CALIPHATE

NATIONAL PARKS. See PARKS, NATIONAL.

NATIONAL PROBATION ASSOCIATION. See JUVENILE COURTS.

NATIONAL SAFETY COUNCIL. A cooperative, noncommercial organization established in 1913 as an outgrowth of the safety congress held under the auspices of the Association of Iron and Steel Engineers in Milwaukee. The council consists of an association of companies and individuals active in promoting safety in industrial establishments, on the streets, and in the homes. Annual meetings are held in which matters relating to this object are discussed. The meeting of 1915 was held in Philadelphia. There were present representatives from the mines, railroads, public utilities, and industrial establishments. Each of these groups held sectional meetings to discuss their technical problems. The Eighth Annual Safety Congress was held in Cleveland in October, 1919. There were meetings of the 19 sections of the Council representing the various industries of the United States. The programme for 1919 included the extension of the work into many new fields. In 1920 the *National Safety News*, organ of the Council, was enlarged from a one-

sheet bulletin to a 12-page magazine and began an active campaign for spreading safety propaganda throughout the country. The annual meeting of 1920 was held in Milwaukee. In 1920 the council continued active in safety propaganda, with great success. Extensive research was continued into the particular hazards and safety practices in the construction and management of particular equipment. The congress of the Council in 1922 was held in Detroit, Mich. Over 2000 members met to discuss their problems and to hear speakers of national reputation. Work with schools was vigorously carried on. Through a publication entitled *Education in Accident Prevention: Methods and Results*, the city superintendents in all cities of 20,000 or more population were reached, and in many cases a definite safety plan was incorporated in the curriculum Gratifying progress was reported in the activities of the organization in 1923. Two million copies of workmen's bulletins were distributed during the year, at the rate of 36 new and different ones per month. The magazine grew to 64 pages. The 12th annual congress was held in Buffalo in October. Over 3500 delegates were in attendance, representing every State in the Union and every major industry in North America. The Council in this year had 23 specialized sections relating to all phases of industry. Its membership was about 4000, operating 8000 industrial plants, and employing more than 7,000,000 men Community safety councils had by this time been organized in 60 cities to carry on public and industrial safety work in each community. Combined population of these cities where organized safety programmes are under way totaled 25,000,000 in July, 1924. L. A. DeBlois was elected president in 1923, and C. B. Auel was chosen vice president in charge of general activities. The managing director and secretary was W. H. Cameron.

NATIONAL SYMPHONY ORCHESTRA. See MUSIC, *Orchestras.*

NATURAL GAS. Although fears were expressed as to the ultimate exhaustion of natural gas in the years 1914–24, consumption increased, and systems of pipe lines were developed from the leading production centres, of which West Virginia, Oklahoma, Pennsylvania, Ohio, and California were perhaps the most important. In 1913 the consumption of natural gas in the United States was 581,898,239,000 cubic feet, 38 per cent of which was consumed by domestic consumers and 62 per cent by industrial consumers. The average price per 1000 cubic feet received by distributors at this time was $.051. In 1914 the natural gas consumed was 591,867,000,000 cubic feet, and from this time it steadily increased until in 1920 the maximum consumption of 798,210,000,000 cubic feet was scored. In the following year, 1921, there was a decline in the consumption, which then amounted to 662,052,000,000 cubic feet, and the market value of the gas used was about $175,000,000, a decrease about $25,000,000 in the value from 1920.

At this time there were more than 2,500,000 domestic consumers of natural gas and about 21,000 industrial concerns using it as fuel. In the following year, 1922, 762,546,000,000 cubic feet were consumed in the United States, at an estimated value of $84,873,000 at the wells and of $221,535,000 at the points of consumption. By 1919 the cost at the point of distribution had increased to $.216 per 1000 cubic feet, and in 1922 it was $.291 per 1000 cubic feet. In 1922 the average charge for domestic consumption was $.499, an increase of more than $.15 in the previous four years. The 1922 consumption was some 15 per cent more than that of 1921 but 4 per cent less than the amount consumed in the record year of 1920. The five leading States in production were West Virginia, Oklahoma, Pennsylvania, Louisiana, and California. The amount of production did not measure the relative consumption of the various States, as Pennsylvania in 1922 led as a consumer, followed by Ohio, Oklahoma, California, and West Virginia. There was also an increased interstate movement of natural gas, which, by 1922, had amounted to 179,000,000,000 cubic feet. West Virginia, which contributed 25 per cent of the total production and consumed only 10 per cent, contributed 66 per cent of the gas transported to other States, where the average price per 1000 cubic feet in 1913 was $.051 at the point of distribution.

In 1924 the industry had developed to a stage where the production and transportation of natural gas was no longer characterized by wastefulness and inefficiency. Various methods were adopted to conserve this fuel, as it was realized that while it was fast disappearing it was a commercially valuable natural resource.

In addition to domestic and industrial uses as fuel, an important branch of the industry was the manufacture of gasoline from natural gas. In 1911, when the United States Geological Survey collected its statistics for gasoline from natural gas for the first time, it was reported that the year's production of gasoline thus obtained amounted to 7,425,839 gallons valued at $531,704, or $.0716 per gallon. This gasoline represented the output of 176 plants conducted by 132 operators, with a total daily capacity of 37,100 gallons, and employing an estimated volume of natural gas of 2,475,697,000 cubic feet, which was valued at $176,961. The average yield of gasoline per 1000 cubic feet was 3 gallons. This industry steadily increased, so that in 1914 the amount of gasoline produced was 42,652,632 gallons valued at $3,105,909. By 1922 the production of natural gas and gasoline amounted to 505,832,000 gallons, valued at the plants at $72,711,063, or an average of $.144 per gallon. To produce this gasoline, 545,000,000,000 cubic feet of natural gas were treated, or approximately 71 per cent of the total quantity consumed for the year. Gasoline from natural gas was produced by what is known as the compression process, which in 1922 accounted for 285,670,163 gallons; by the absorption process, by which were manufactured 182,209,056 gallons; by a combination process, which produced 36,035,999 gallons; and by a drip process, which produced 1,916,782 gallons. See CHEMISTRY, ORGANIC.

Bibliography. Besides the publications of the United States Geological Survey and the United States Bureau of Mines, which are generally available, reference may be made to L. C. Lichty, *Measurement Compression and Transmission of Natural Gas* (New York, 1924), and the chapters on natural gas in *The Handbook of the Petroleum Industry*, 2 vols., edited by D. T. Day (New York, 1922). This volume discusses the manufacture of gasoline from natural gas.

NATURAL SELECTION. See ZOÖLOGY.

NAUMANN, (JOSEPH) FRIEDRICH (1860–1919). A German publicist, prominent in the war literature of his country (see VOL. XVI). His last works are *Bulgarien und Mitteleuropa* (1914); *Deutschland und Frankreich* (1914); *Mitteleuropa,* the famous work in which he outlined a vast Central European empire for Germany (1915); *Wie Wir Uns im Kriege Verändern* (1916); *Kriegs- und Heimats Chronik,* in collaboration with Dr. Gertrud Bäumer (1916–17); *Der Weg zum Volksstaat* (1918); and *Gestalten und Gestalter* (1919).

NAURU. See PACIFIC OCEAN ISLANDS.

NAVAL AËRONAUTICS. See NAVIES OF THE WORLD, *United States.*

NAVAL OPERATIONS. See WAR IN EUROPE, *Naval Operations.*

NAVAL PROGRESS. See NAVIES OF THE WORLD; VESSEL, NAVAL; GUN, NAVAL; GUNNERY, NAVAL; NAVIGATION; PROJECTILE.

NAVAL VESSEL. See VESSEL, NAVAL.

NAVIES OF THE WORLD. The approval in 1923 of the Five Power Naval Pact for the limitation of armaments by the Governments of France and Italy put that treaty in force, as the Governments of the United States, Great Britain, and Japan had given their assent soon after the conclusion of the Conference. While its terms only then became binding on the signatories, no one of the five powers had in any way contravened any of them since the Pact was originally signed by the diplomats at the Disarmament Conference. Not only did new work cease, but scrapping of the older vessels designated for such a fate by the Pact had to a considerable extent been carried out. Scrapping of the new vessels was proceeding at a rapid rate in 1924. The general condition of the more important navies of the world on July 1, 1924, was briefly as follows.

Argentina. The navy consists of 2 dreadnaught battleships of 27,600 tons (12 12-inch guns) completed in 1914; four armored cruisers of 6800 to 7100 tons, completed 1895–97; three old protected cruisers of 2750 to 4800 tons, completed 1892–97; two old monitors of 2336 tons, completed 1892–93; 8 destroyers of 1100 to 1200 tons, completed 1911; several large gunboats, river gunboats, transports, old torpedo boats, etc. It was proposed to refit the battleships in the United States and to order about 12 large destroyers.

Austria possessed neither navy nor seacoast but had four armed patrol vessels on the Danube.

Australia. Since the close of the War, the Australian navy was steadily reduced. Late plans called for the sale of 24 out of the 34 vessels on the navy list. Those to be retained were four light cruisers of about 5500 tons, completed 1912–20; one flotilla leader of 1660 tons, completed 1917; and five destroyers of 1250 tons, 36 knots, completed 1919. At last accounts in 1924 there still remained on the list six submarines of 1820 tons, completed 1917–19; several destroyers of 700 tons, and 3 1250-ton sloops, completed 1915. These were all effective vessels and in good condition. The battle cruiser *Australia* was scrapped in accordance with the terms of the Five Power Naval Pact. From statements which appeared in the British and Australian press it appeared that Australia desired to depend for defense chiefly on the British fleet but would pay her share of the cost of defense by the Royal Navy.

Brazil. The Brazilian Congress authorized the construction of a training-ship, a mine transport, and a surveying ship. The Minister of Marine proposed the construction of a battleship of 35,000 tons, a cruiser of 10,000 tons, 5 destroyers, 5 submarines, an aircraft service, and some mine-layers and sweepers. The navy in 1924 consisted of 2 battleships of 19,281 tons (12 12-inch guns), completed in 1910; 2 armored coast defense vessels, 1900–01; 2 light cruisers of 3100 tons and 27 knots, 1910; 2 old cruisers; 4 river gunboats; 1 mine-layer; 2 river monitors; 10 destroyers of 550 tons, completed in 1908–10; 1 destroyer of 950 tons, 1913; 1 torpedo boat, 1907; and 3 submarines, 1914.

Canada. Having from motives of economy reduced her naval, military, and air establishments to almost nothing, Canada consolidated them under the new Ministry of Defense. The naval force in 1924 consisted of 2 destroyers and 4 mine-sweepers, half based at Halifax and half at Equimault, where they were used to train the Canadian naval reserve which was to act as a nucleus in case future naval expansion should be found necessary.

Chile. The navy consists of one modern battleship of 28,000 tons, 10 14-inch guns, 23 knots speed, completed in 1915; 1 old battleship of 6000 tons; 2 old armored cruisers of 7000 and 8500 tons; 5 old protected cruisers of 2000 to 4500 tons; 4 flotilla leaders of 1700 to 1850 tons, completed in 1912–14; 7 small destroyers, 3 torpedo boats; 2 submarines, 1913. It was said in 1924 that notwithstanding their age, the vessels of the Chilean navy were in serviceable condition and that the efficiency of the personnel was excellent.

China. The Chinese navy as a unified force no longer existed. There were many small cruisers, gunboats, destroyers, torpedo boats, etc. Some vessels were controlled by the Canton government; some by the government at Peking; others were a law unto themselves or had unknown affiliations. The natural result was a breakdown of morale and discipline as well as a deterioration of the vessels from lack of care and of means for effecting repairs and preservation.

Denmark. In the naval budget for 1923–24, 10,342,000 crowns were allotted for new construction, including aircraft and aviation supplies. The new construction comprised 2 submarines and 1 lighthouse tender and ice breaker. The Danish navy consisted of 5 armored coast defense vessels of 2200 to 4100 tons; 4 small cruisers of 1300 to 3000 tons; about 15 mine-layers and sweepers; and various auxiliary vessels. The personnel had a high reputation for efficiency.

France. After a long delay, the French government signed the Five Power Naval Pact for the limitation of naval armaments. As France and Italy were the real gainers by the carrying out of the Pact, their attitudes toward it were rather remarkable. Were it not for the Pact, the United States, Great Britain, and Japan would soon have possessed navies of such strength that those of France and Italy would have descended to relative impotence. The United States alone scrapped tonnage of six times the fighting value of existing French dreadnaughts. Instead of possessing a navy in 1925 of 10 times the power of France, the United States restricts itself to 3 times. Great Britain

and Japan made great if considerably less reductions.

The building programme under construction in France in 1924 consisted of 3 light cruisers of 8000 tons, 6 flotilla leaders of 2400 tons, 12 torpedo boats of 1450 tons, 6 submarines of 1100 tons and 6 of 680 tons; the battleship *Bearn*, only partly built, was to be transformed into an airplane carrier of about 23,000 tons. These vessels were to be completed in 1925. The second part of the naval programme, which up to the summer of 1924 had not been wholly authorized by the French Parliament, was designed to be laid down during the years 1925–28 and completed in 1930. It consisted of 6 light cruisers of 10,000 tons, 15 flotilla leaders of 2400 tons, 24 destroyers of 1450 tons, 4 submarine cruisers of 3000 tons, 30 first-class submarines of 1300 tons. The cruisers of 8000 tons were to have a speed of 34 knots and to carry 8 6.1-inch guns in 4 turrets, 4 2.95-inch anti-aircraft guns, and 4 21.7-inch torpedo tubes. Two 10,000-ton cruisers were to be laid down in 1925. The reported details were: speed, about 35 knots; battery, 8 8-inch guns and 20 anti-aircraft guns. As the weight necessary to armor the upper deck as a defense against air-bombs would reduce the possible speed, numerous anti-aircraft guns were substituted. It is expected that they will enable the ship to meet attacking airplanes with a hail of chemical projectiles. The 8-inch guns were to be mounted in gas-tight turrets to obviate danger from gas bombs and gas shells The flotilla leaders were to be of about 2400 tons. The principal details were: length, 380.6 feet; beam, 36 3 feet; mean draft at a displacement of 2400 tons, 14 8 feet; speed, 35.5 knots; armament, 6 5.1-inch guns, 2 2.9-inch anti-aircraft guns, and 2 triple torpedo tubes for 21.7-inch torpedoes. The destroyers were to be of 1400 tons; speed, 33 knots; armament, 4 5.1-inch guns.

The French navy in 1924 consisted of 6 dreadnaught battleships of 23,100 tons, 2 carrying 10 13 4-inch guns and 4 carrying 12 12-inch guns; 3 old battleships of 18,890 tons carrying 4 12-inch and 12 9 4-inch guns; 10 old armored cruisers of 9400 to 14,100 tons but of little fighting value; 5 (ex-German) light cruisers (26 to 28 5 knots); 19 destroyers of 800 to 950 tons, 27 destroyers of 350 to 685 tons; and about 60 submarines.

Germany. The Allied Supreme Council increased the number of battleships and of cruisers which Germany was permitted to retain from 6 to 8, the additional 2 to be always in reserve without ammunition or supplies The battleships might be replaced by new ones of not more than 10,000 tons and the cruisers by new ones of not more than 6000 tons, after 20 years from the date of completion. All will have reached that age before new ones can be built. The only vessel under construction in 1924 was a light cruiser of 5600 tons. The 8 battleships were of 13,000 tons and were to carry 4 11-inch and 14 6.7-inch or 5.9-inch guns. The 8 cruisers were small and all but 2 were over 20 years old. There were 16 destroyers and 16 torpedo boats.

Great Britain. The Naval Estimates for 1924–25 called for an expenditure of £55,800,000. The personnel of the navy, coast guard, aviation service, and marine police was fixed at 100,500, an increase of 1000 over the figures for the previous year. The vessels under construction or to be laid down in 1924 were the battleships *Nelson* and *Rodney*, commenced early in 1923, 2 or 3 submarines, 7 to 9 light cruisers of about 10,000 tons, and the mine-layer *Adventure* of 7000 tons. The aircraft carriers *Eagle* (22,700 tons) and *Hermes* (10,400) had been under construction for many years but were not reported as completed by the middle of 1924.

The battleships *Nelson* and *Rodney* were the only vessels of their class under construction in any country in 1924. Their displacement was the maximum allowed by the Five Power Naval Pact, 35,000 standard tons. This was computed on a slightly different basis from that of existing capital ships, but they would probably be 3000 tons larger than any existing battleships except the British *Hood* and 6000 to 10,000 less than most of the capital ships scrapped under the terms of the Pact. As their design was an attempt to solve problems of naval construction which appeared to demand much greater size, it was being studied with interest by all naval authorities. The principal details available, July 1, 1924, were: length, 660 feet; beam, extreme, 106 feet; mean draft, 30 feet; speed, 23 knots; boilers, oilburning; engines, geared turbines; 3 turrets, each mounting 3 16-inch guns; all turrets on the central line, 2 on the forecastle, the after one firing over the other, the third just forward of the smokepipe; no stern fire from 16-inch guns, but the after turret could fire nearly astern with the outboard guns; 12 6-inch guns in 6 turrets, 3 on each beam; 12 4-inch anti-aircraft guns with vertical or nearly vertical fire; above-water triple torpedo tubes for 21-inch torpedoes; quarter-deck clear of all structures in order to permit the landing and despatch of airplanes; armor belt, 13 inches thick; 3 armor decks, upper deck, deck at top of belt, and curved deck extending to lower edge of belt; side heavily bulged and compartmented for antitorpedo protection; hydraulic steering and turret machinery.

The new submarine *X1*, completed in 1923, had finished her trials in 1924 and was said to have failed to realize the hopes of her designers. She was much the largest submarine ever built, having a submerged displacement of 3500 tons and a surface displacement of 2750 tons with corresponding speeds of 18 and 33 knots. The Admiralty and seagoing officers of all ranks in 1924 were fighting hard to obtain entire control of the naval aviation service. To have the most suitable designs for naval aircraft, which differ widely from those in land service, to have naval aviators who possess intimate knowledge of the details of naval affairs, and to have a continuous naval organization and control of the air forces of each fleet or other naval unit are so vital to efficiency that the slight financial gain in a consolidated air service should not be considered.

The vessels of the British navy in 1924 were: 5 battleships of 25,750 tons (8 15-inch guns, 23 knots), 5 battleships of 27,500 tons (8 15-inch guns, 25 knots), 4 battleships of 25,000 tons (10 13.5-inch guns, 21 knots), 4 battleships of 23,000 tons (10 13.5-inch guns, 22 knots), 1 battleship of 41,200 tons (8 15-inch guns, 31 knots); 1 battle cruiser of 28,500 tons (8 13.5-inch guns, 30 knots), 2 battle cruisers of 26,500 tons (6 15-inch guns, 32 knots); 35 light cruisers with a speed of 29 knots (14 of 3750 tons,

3 of 4120 tons, 10 of 4190 tons, 8 of 4750 tons), 6 light cruisers of 25.5 knots (3 of 5250 tons, 3 of 5400 tons), 3 light cruisers of 9750 tons and 30 knots, and 3 of 7550 tons and 32 knots; 17 flotilla leaders of 1610 to 1800 tons; 170 destroyers of 1040 to 1350 tons and 34 to 36 knots; 27 steam sloops of 1250 tons and 17 knots; 56 twin-screw mine-sweepers of 800 tons and 16 knots; 16 patrol boats of 573 tons and 22 knots; and 92 submarines of 500 to 3500 tons (submerged), most of them of 800 to 1100 tons.

Greece. The defeat of Greece by the Turks and the various political upheavals and financial disturbances interfered with the development of the navy. The fleet in 1924 consisted of 2 pre-dreadnaught battleships (formerly the *Mississippi* and the *Idaho*) of 13,000 tons, 1 armored cruiser of 9956 tons and 24 knots; 1 light cruiser of 2600 tons and 23 knots; 11 destroyers of 350 to 980 tons; and 2 submarines of 460 tons. The dreadnaught battleship *Kalamis* was ordered in Germany in 1913. At the close of the War she was still far from finished but probably would be completed in a French shipyard. As designed, the displacement was 19,500 tons; length, 570 feet; beam, 82 feet; draft, 26 feet; speed, 25 knots; battery, 8 14-inch guns, 12 6-inch guns, and some of 3-inch calibre. In addition to completing the *Kalamis*, Greece ordered 4 large destroyers in England.

Italy. The naval budget for 1923–24 was 770,465,015 lire (1 lira = about $.043). No new construction of any importance was in hand. A building programme was announced in 1923, the work to begin as follows: 1924–25: 2 light cruisers, 4 destroyers, 4 submarines; 1925–26: 4 destroyers, 4 submarines; 1926–27: 4 destroyers, 4 submarines; 1927–28: 1 light cruiser, 4 destroyers, 4 submarines. The Italian navy in 1924 consisted of 5 battleships of about 22,500 tons (13 12-inch guns, 23 knots), 1 battleship of 19,500 tons (12 12-inch guns, 24 knots), 4 predreadnaught battleships of 12,600 tons; 3 armored cruisers of 9956 tons and 22.5 knots; 8 light cruisers of 3200 to 4800 tons and 27 to 28 knots, 1 light cruiser of 3700 tons and 22 knots; 8 flotilla leaders or scouts of about 35 knots speed, 2 of them of 1500 tons, 2 of 1800 tons, 3 of 2158 tons, and 1 of 2500 tons; 14 destroyers of 320 to 380 tons, 42 destroyers of 650 to 850 tons, 12 destroyers of 922 to 1012 tons, 1 destroyer of 1354 tons; about 90 torpedo boats of 110 to 210 tons; 33 submarines of 300 to 460 tons, and 10 of 920 to 1000 tons. One of the battleships of 22,500 tons, the *Leonardo da Vinci*, was blown up and sunk during the War; it was later raised, but whether it would be repaired or not was uncertain.

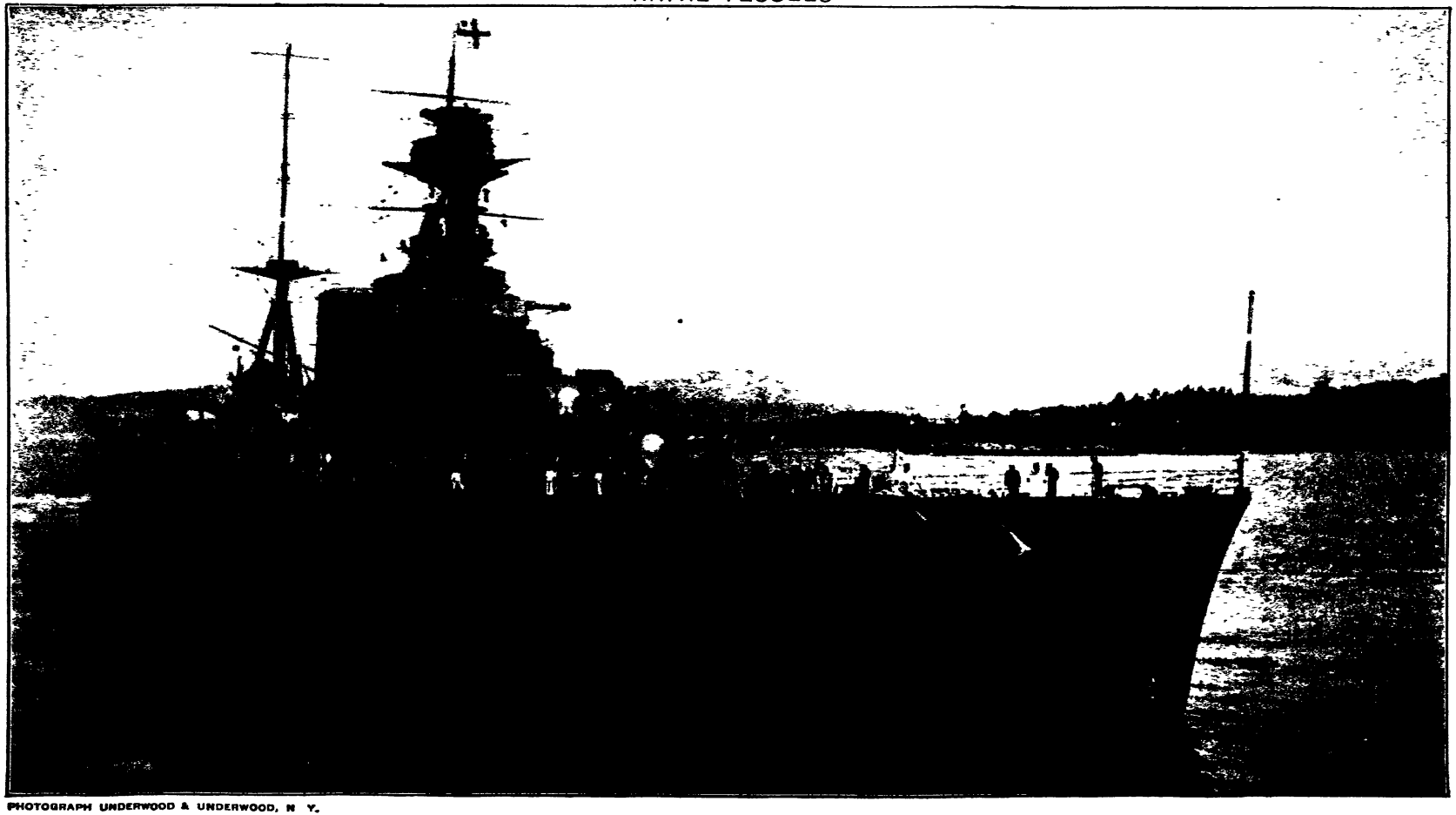
Japan. The naval budget for 1924 was 238,500,000 yen (1 yen = about $.41). Notwithstanding the damages inflicted by the earthquake, the vessels of the 1923–24 programme were to be laid down as soon as the various shipyards were free to undertake the work. This programme included: 4 light cruisers of 10,000 tons, 2 of 7100 tons; 18 destroyers of about 1500 tons; 16 submarines with submerged tonnages of 1500 to 2500 tons. All vessels of the programme were to be completed by 1928. On July 1, 1923, the following vessels were under construction: 1 light cruiser of 3100 tons, 5 of 5600 tons, 2 of 7100 tons; 7 destroyers of 1400 tons and 4 of 900 tons; 2 airplane carriers (ex-battle cruiser *Akagi* and ex-battleship *Kaga*); 4 gunboats of 338 tons; 5 auxiliary service vessels. The number of light cruisers completed, building, or authorized since 1918 was 25; all had speeds of 33 knots or more. The navy yard at Yokosuka was damaged by the earthquake to the extent of 35,000,000 yen, and other yards, public and private, were seriously injured. One of the greatest losses was that of the great oil storage tanks which held about 3,000,000 barrels. All the earthquake damages were being rapidly repaired, and the Yokosuka yard was to be ready to undertake shipbuilding work soon after June, 1924.

The Japanese fleet, including light cruisers and smaller vessels under construction, in 1924 consisted of 2 battleships of 33,800 tons (8 16-inch guns, 23.5 knots); 2 battleships of 31,260 tons (12 14-inch guns, 23 knots), 2 battleships of 30,600 tons (12 14-inch guns, 23 knots); 4 battle cruisers of 27,500 tons (8 14-inch guns, 27.5 knots); 3 armored cruisers of 9800 tons; 4 light cruisers of 10,000 tons (35 knots), 4 of 7100 tons (35 knots), 14 of 5600 tons (35 knots), 3 of 4950 tons (26 knots), 1 of 4100 tons (23 knots), 2 of 3500 tons (31 knots), 1 of 3100 tons (34 knots); 18 destroyers of 1500 tons, 7 of 1400, 22 of 1350, 6 of 1200, 25 of 900, 1 of 955, 18 of 835, 10 of 665, and 2 of 600. The details of Japanese submarines are rarely published There were said in 1924 to be about 80 boats including those already mentioned as belonging to the new programme of construction.

Netherlands. Several building programmes, including one in 1923, were submitted to the Netherlands Parliament, but all were rejected The vessels of the navy in 1924 consisted of 5 armored coast-defense ships of 5000 to 6500 tons (1903–1910); 2 new light cruisers of 7050 tons and 30 knots, 3 or 4 old cruisers of 4000 tons; 3 armored gunboats of 540 tons, many other gunboats at home and in the Dutch East Indies; 4 new mine-layers (1922) of 750 tons, 12 other mine-layers; 4 small mine-sweepers, 1 new submarine dépôt ship of 2500 tons; 8 destroyers of 480 tons; 8 torpedo boats of 322 tons, 7 torpedo boats of 130 to 190 tons; 11 submarines of about 700 tons, 3 of 380 tons, 5 of 150 to 234 tons, and 1 submarine mine-layer.

Norway. The naval budget for 1922–23 was 21,340,160 crowns (par value $0.268). Two submarines of 420 tons in 1924 were building in Norway. The vessels of the navy were 4 armored coast-defense ships of 3920 to 4233 tons; 1 small cruiser of 1350 tons; 9 gunboats of 190 to 620 tons; 3 destroyers of 540 tons; about 30 torpedo boats of 65 to 220 tons; 4 submarines of 255 tons, 2 submarines of 420 tons; and 3 new mining vessels of 335 to 755 tons.

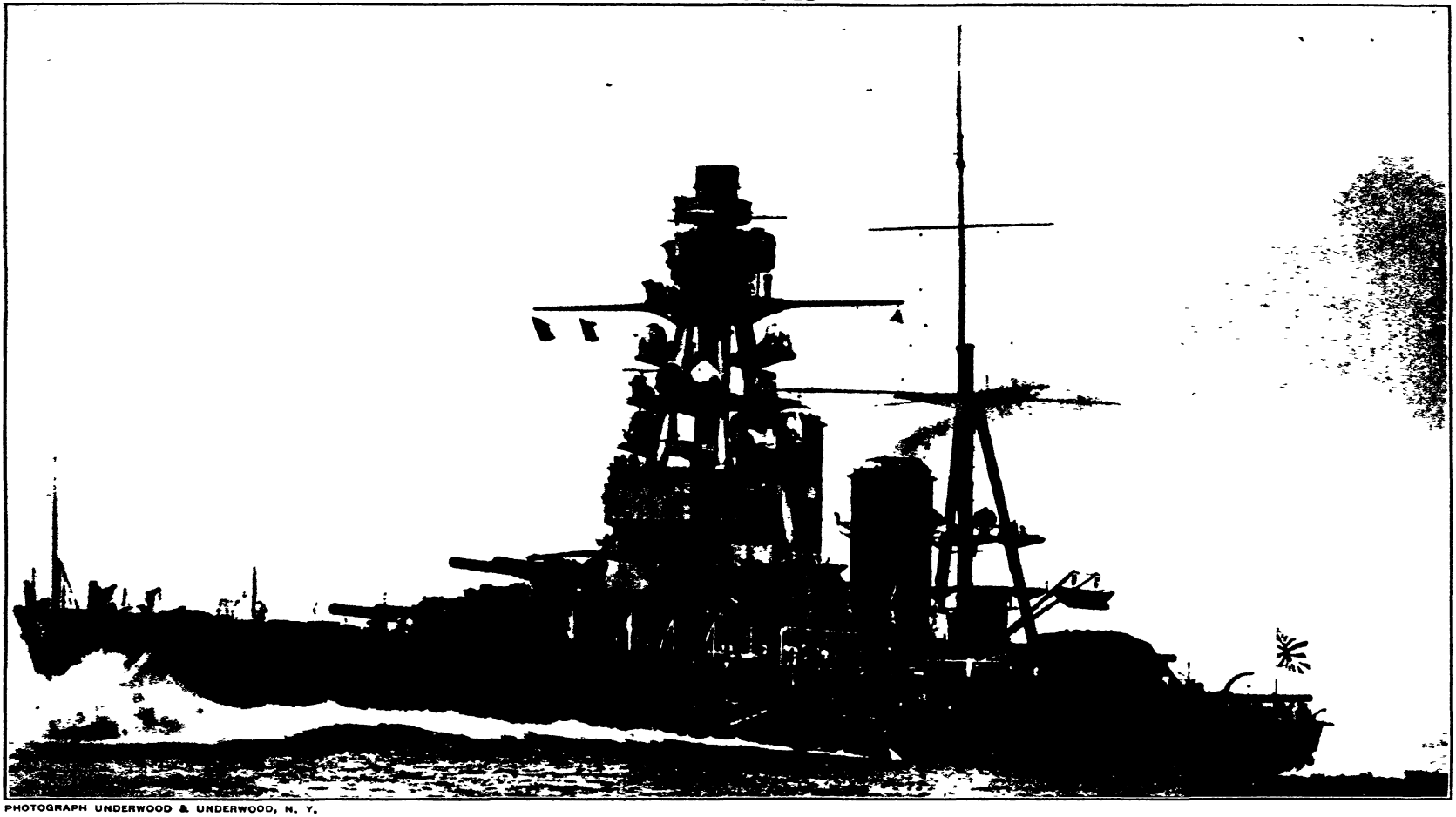
Russia. The Russian navy by 1924 apparently was becoming less and less efficient, partly from lack of regular organization, partly from lack of intelligent control and care of vessels and equipment, and partly from lack of sufficient funds to keep the vessels and equipment in repair. One dreadnaught battleship was usually kept in commission and one in reserve: the other battleships and cruisers were unfit for service. A number of destroyers and submarines were kept in commission, but whether effective or not was unknown. Other vessels in service were mine-sweepers, mine-layers and ice breakers. Two divisions of destroyers were in commission in the Black Sea, but no large ves-



PHOTOGRAPH UNDERWOOD & UNDERWOOD, N Y.

THE BRITISH BATTLE CRUISER "HOOD" — THE LARGEST WARSHIP IN THE WORLD, 1924

Displacement 41,200 tons Speed 31 knots Battery, eight 15-inch guns



PHOTOGRAPH UNDERWOOD & UNDERWOOD, N. Y.

BATTLESHIP "MUTSU" OF THE JAPANESE NAVY

Displacement, 33,800 tons Speed 23.5 knots Battery, eight 16-inch guns

sels. Much attention was being paid to aviation, and efforts were being made to extend the service.

Spain. The naval budget for 1923–24 was 125,899,543 pesetas (par value = $0.193). It provided for an enlisted force of 13,000 in the seaman branch and 2550 marines. The vessels building in 1924 were: 2 light cruisers of 4725 tons and 29 knots, and 2 of 7975 tons and 33 knots; 3 submarines of 610 tons; 3 flotilla leaders of 1650 tons and 36 knots; 3 destroyers of 1145 tons and 34 knots; 3 gunboats of 1335 tons and 18 knots. In addition to the foregoing, the vessels of the navy in 1924 were: 2 dreadnaught battleships of 15,500 tons (8 12-inch guns, 19.5 knots), 1 old (1888) battleship of 9733 tons; 3 old (1898) armored cruisers of 7400 to 9900 tons; 1 old light cruiser of 5800 tons and 19.5 knots, 1 light cruiser of 5590 tons and 25 knots, 1 old light cruiser of 2100 tons and 19 knots; 5 gunboats of about 800 tons; 1 mine-layer of 1773 tons; 1 submarine salvage vessel of 2100 tons; 7 destroyers of 300 to 460 tons; 22 torpedo boats; and 10 submarines, 3 of them of 383 tons, 6 of 740 tons, and 1 of 685 tons.

Sweden. The navy of Sweden in 1924 consisted of 3 new armored coast-defense vessels of 7605 tons and 22 knots, 6 older ones (1901–07) of 3620 to 4700 tons and 16 to 18 knots, 7 others (1891–99) of 3400 to 3715 tons; 1 armored cruiser of 5000 tons and 22.5 knots; 1 mine cruiser of 1800 tons and 20 knots; 4 torpedo gunboats of 830 tons and 20 knots; 4 other small gunboats; 10 destroyers of 480 to 500 tons and 30 knots; 17 torpedo boats of 106 to 120 tons and 25 knots, 10 torpedo boats of 60 tons; 11 submarines of 370 tons, and 5 smaller submarines.

Turkey. The Treaty of Sèvres deprived Turkey of her naval force and nearly all her seacoast. The Treaty of Lausaune returned the most valuable parts of her seacoast as well as the remains of her fleet, consisting of the battle cruiser *Sultan Selim* (formerly the *Goeben*, 22,640 tons, 10 11-inch guns, 28 knots); the old battleship *Torgut Reis* (formerly the *Weissenburg*, 9900 tons, 6 11-inch guns, 17 knots); the old protected cruisers *Hamidieh* (3800 tons) and *Medjidieh* (3400 tons); 9 small torpedo boats of 100 to 200 tons; 9 gunboats of 200 to 500 tons; an armed yacht, and several motor boats. The vessels in 1924 were all in urgent need of repairs, which were to be made at the naval dockyard at Constantinople. This yard was being repaired, refitted, and improved by British shipbuilding companies.

United States. The only vessels under construction for the navy in 1924 were: 2 large aircraft carriers (*Lexington* and *Saratoga*, commenced as battle cruisers); 2 light cruisers of 7500 tons; 2 destroyer tenders; and 3 fleet submarines. The programme of new construction presented to Congress by the Secretary of the Navy consisted of 8 light cruisers of 10,000 tons, 6 light-draft gunboats for use on Chinese rivers, and 3 large submarines. The vessels of the navy in 1924 were: 3 battleships of 32,600 tons (8 16-inch guns, 21 knots), 2 battleships of 32,300 tons (12 14-inch guns, 21 knots), 3 battleships of 32,000 tons (12 14-inch guns, 21 knots), 2 battleships of 31,400 tons (12 14-inch guns, 21 knots), 2 battleships of 27,500 tons (10 14-inch guns, 20.5 knots), 2 battleships of 27,000 tons (10 14-inch guns, 21.5 knots), 2 battleships of 26,000 tons (12 12-inch guns, 21 knots), 2 battleships of 21,825 tons (12 12-inch guns, 21.5 knots); 3 armored cruisers of 14,500 tons, 5 of 13,680 tons, 2 of 9700 tons, 1 of 8200 tons; 10 light cruisers of 7500 tons and 34 knots, 3 of 3750 tons and 25 knots; 7 protected cruisers of 3200 to 3500 tons; 8 gunboats of 1000 to 1575 tons; 6 large mine-layers; 17 submarine and destroyer tenders; 2 aircraft carriers; 1 airship tender; 6 repair ships, 3 supply ships, 4 hospital ships, 25 fuel ships; also small gunboats, tugs, and miscellaneous vessels; 237 destroyers of about 1200 tons and 35 knots, 44 destroyers of 1000 to 1100 tons and 30 knots, 21 destroyers of 720 tons and 30 knots; and about 100 submarines.

The personnel of the navy in 1924 consisted of 7816 officers and 85,790 enlisted men. During the War there were 32,474 officers and 550,736 enlisted men. On June 30, 1923, there were 4222 officers in the Naval Reserve Force and about 11,000 men.

As regards matériel, the greatest needs of the navy in 1924 were: (a) repair of battleships; (b) more light cruisers; (c) some flotilla leaders; (d) large submarines for fleet service; (e) more aircraft The repair of battleships includes an increased elevation of the turret guns in all except the very latest vessels, the application of thin armor to the upper deck as a protection against aircraft bombs, the application of bulges and compartmentation below water as a protection against torpedoes, and a general repair and refitting of hull and machinery, particularly the latter In a spirit of mistaken economy, Congress and the demands of the budget cut the maintenance appropriations for the fleet until the sums allotted became wholly inadequate for the preservation of the vessels and machinery and still less adequate to secure efficiency. The deck armor, antitorpedo bulges, and the elevation of the guns were deemed necessary to place the battleships on the same plane of efficiency as the vessels of Great Britain and Japan. These repairs and changes could be effected without contravening the terms of the Five Power Naval Pact for the limitation of naval armaments. Compared with the British and Japanese navies, that of the United States in 1924 was particularly deficient in light cruisers. Of vessels of this type less than 10 years old, Great Britain had 47 of 243,240 tons and was building at least 7 more of about 10,000 tons each; Japan had 25 of 157,730 tons; and the United States had 10 of 75,000 tons. To preserve her parity with Great Britain, the United States needed 25 or more cruisers of 250,000 tons; and to hold her 5–3 ratio with Japan she needed 19 or more cruisers of 188,000 tons. Not less than 10 flotilla leaders and 10 large submarines were required. As to aircraft, the navy needed at least three times its force of 1924.

Fortunately for its efficiency, for its development along desired lines, and for its usefulness to the fleet and other naval purposes, the entire control of the naval air service was vested in the Navy Department. The Bureau of Aëronautics was established on Sept. 1, 1921. Before that date, naval aviation was divided between several different bureaus in a manner to prevent coördination of its various parts. The Bureau was carefully and thoroughly organized under its first chief, Rear-Admiral W. A. Moffett, and under his efficient guidance

the naval air service greatly improved and continued to gain as rapidly as the insufficient appropriations permitted. As a demonstration of the efficiency of the service, United States navy fliers established, in 1923, 23 out of the 42 recognized world's records for aircraft performance. In October, 1923, the Bureau completed the *ZR1*, the first rigid airship of the Zeppelin type to be built in America. Christened the *Shenandoah*, it was subjected to many tests and trials, all but one of which it passed satisfactorily; while riding at its mooring mast a 72-mile gale drove with such force that its whole bow was torn off. The ship nevertheless weathered the storm and after 9 hours returned and was nosed into her hangar. The *Shenandoah* is 680 feet long, has a diameter of 78.7 feet, a gas capacity of 2,150,000 cubic feet, and is filled with helium. It is driven by 6 300-horse power Packard engines with a maximum speed of 75 miles per hour and a cruising speed of 65 miles The crew consists of 9 officers and 22 men. For sectional diagram and illustration, see AËRONAUTICS Another airship of the Zeppelin type was built in Germany and was ready for delivery in 1924 It was styled the *ZR3*. It is 656 feet long, 90 feet 9 inches in diameter, and has a gas capacity of 2,475,000 cubic feet. In addition to rigid airships, the air service was equipped with nonrigid dirigibles, kite balloons, free balloons, seaplanes, airplanes of land types, torpedo-planes, etc. One of the most interesting of the seaplanes was the *MS1*, designed for use by submarines. It had an all-metal body and was of such small dimensions that with wings folded it could be stowed in a little compartment immediately below the deck of the submarine. This compartment was not water-tight, but water would not injure the plane It could be hoisted out and made ready in a few minutes. It takes off from the water and on return descends to the surface alongside the submarine. See VESSEL, NAVAL; BOMBING OF VESSELS; WAR IN EUROPE, *Naval Operations*

NAVIGATION. The art of navigation was greatly improved in the decade 1914–24 by the invention of new devices and the further development of old ones. The net result was increased safety for shipping, especially in the vicinity of land, and greater ease and economy in handling it everywhere. The most noteworthy of the devices were the radio compass, sonic sounding, the gyro-pilot, cable steering, the earth induction compass, and the auxiliary rudder.

Radio Compass. This is a device for the reception of the electromagnetic waves used in radio telegraphy and for determining the direction of their source. Its operation is based on the fact that radio waves have most effect on an antenna or loop when its plane is in the direction of the propagation of the waves If the waves are not deflected by intervening land or other objects, the plane will point toward the source. Great care is taken to prevent such deflection, but some always exists. This is eliminated from the final result in well-placed and carefully screened stations by determining a curve of error which gives the proper correction to apply to each observed bearing. The compass itself consists of a vertical coil pivoted on a vertical axis rising from the centre of a dumb compass which is set with its zero pointing north. The operator rotates the vertical coil until in the position which gives the minimum of sound in the head 'phone. The pointer over the dumb compass then gives the direction of the transmitting station, subject to correction for error. Radio compasses are installed on board ship as well as ashore, but the shore stations give the best results, as the deflecting objects on large vessels are numerous and troublesome. A ship may thus determine the direction of a shore station, or a shore station may determine the direction of a ship and give her the information by radio. Simultaneous reports from two shore stations may be plotted on a chart; gnomonic projection must be used if over 50 miles away; and the exact location of the ship may be determined, a most important matter in a heavy fog. A large number of shore stations, established on the east and west coasts of the United States and on the Great Lakes, are of great use in foggy weather or when a ship is beyond visual range of definable shore objects but within 150 miles of a compass station.

Sonic Sounding. Deep-sea sounding was until late in the decade effected by means of a long wire and a detachable sinker. The sonic sounding apparatus or automatic depth recorder was developed and perfected by Dr. Harvey C Hayes, sound aide and physicist of the Naval Experiment Station at Annapolis, Md It consists of an oscillator mounted in a tank in the stern of the ship and a hydrophone installed in the bow. Wires from both lead to the bridge or charthouse. Oscillator sound signals are made by the operator. The sound wave, traveling about 4840 feet per second, goes to the ocean bed, is reflected back, and is caught by the hydrophone receiver which measures the elapsed time. This time interval, referred to a scale, gives the depth in fathoms The United States Navy was the first to put the device to practical use. The U.S.S. *Stewart* ran a line of soundings from Newport, R. I., to Manila, P. I., and other naval vessels did similar work in the Atlantic and Pacific Oceans Apparatus of this sort will probably be applied in the near future to all large vessels as its value is so great they cannot afford to be without it.

Earth Induction Compass. This is an instrument devised by Dr. L. J. Briggs and Dr. Paul R. Heyl of the United States Bureau of Standards. It is a development of their airplane compass but is larger and driven by an electric motor instead of wind cups. Two direct currents are generated by revolving two pairs of brushes at a velocity of 1400 revolutions per minute in the magnetic field of the earth. The instrument is so adjusted that when it is set for a compass bearing, the currents flowing from both pairs of brushes are equal and produce no effect on a galvanometer. If the instrument turns even slightly, one current becomes stronger, and the dial needle is deflected. On board ship the generator is placed aloft or as far as possible from the magnetic field of the ship, but the control is in any convenient location This compass, including its fittings, is comparatively inexpensive.

Radio Pilot Cable. A method of keeping a ship in the channel during a heavy fog was tested in the Ambrose Channel leading into the New York harbor. It consists of an electric cable through which flows an alternating current. Ships intending to use the cable are provided with a pair of coils, each connected to a galvanometer.

By noting when the currents in the coils are equal, the navigator can determine when he is astride the cable and can keep over it. For regular service two cables are laid, one for incoming and one for outgoing vessels, carrying currents of different frequency.

Gyro-Pilot. This apparatus, designed and developed by Elmer A. Sperry, the inventor of the Sperry gyro-compass, is a device for automatically steering a ship on any desired course. The course is set on the gyro-compass, and the gyro-pilot not only takes the place of the helmsman in steering but notes each yaw of the vessel as it begins and anticipates the movement by helm change more quickly than a helmsman can. Moreover, it takes cognizance of the speed of the yaw, when increasing and when dying away, and corrects the rudder angle accordingly. The sum total of its efficiency is considerable. It reduces the angle of yaw and the necessary helm angle, on both counts effecting an increase of speed with the same power, and in reducing the yaw cuts down the distance which the ship travels in steering a course between two fixed points

Flettner Rudder. This is a German invention designed to do away with expensive steering gears and to replace them by a simple form of rudder worked by the streamline pressure exerted on the rudder by the water through which the vessel is moving. This is accomplished by a small auxiliary rudder or deflector which is set in a long jog in the after edge of the main rudder and operated independently of it. The combined effect of the deflector and the current of water imparts to the main rudder a large turning movement enabling it to act with prompt and efficient steering effect.

NEAR EAST RELIEF. An organization incorporated by Congress in 1919 for the purpose of affording relief to sufferers in Armenia, Syria, the Russian Caucasus, Mesopotamia, Egypt, Palestine, Macedonia, and other countries. Conditions in these countries in 1919 were characterized by Herbert Hoover as "the most desperate in the world." This was largely due to the fact that the Red Cross did not maintain any relief system in them. The organization succeeded the Armenian and Syrian Relief Commission. Over 7000 tons of flour were distributed per month. It was reported that there were 1,200,000 destitute adults and 250,000 homeless children in the areas affected. Col. William N. Haskell assumed charge of all operations and expenditures in 1919. In 1920 the work of the organization extended from Egypt to the Caucasus and from Constantinople to Mesopotamia and Persia. From northern Turkey, over 500,000 Armenians had escaped to the Russian Caucasus; they were in a destitute condition. In Egypt and elsewhere, hundreds of refugees had settled, and in Persia, as a result of famine in 1917–18, thousands were suffering for the necessities of life. By the end of 1920 more than $42,000,000 had been spent by the organization. The work represented the literal saving from death of hundreds of thousands. The largest and most important service was the work among the children. In 1920 the organization cared for more than 100,000 children, the majority of them in orphanages and the others in soup kitchens and clinics. Conditions were intensified by the fighting in the Caucasus and western Turkey in 1921. Down to the end of 1922 it was estimated that 1,000,000 women and children had been saved from starvation through the efforts of the Relief. Three hundred American workers were employed, besides hundreds of native helpers. At the end of 1922 38 hospitals, 59 clinics, and 124 orphanages were maintained. The total expenditure to July, 1924, was about $78,000,000. Invaluable service was rendered at the destruction of Smyrna, where assistance was given to the thousands of refugees escaping to Greece and elsewhere. In 1923 the Near East Relief concentrated its activities on a child-welfare programme. During the year, on account of the forced evacuation of minority populations at Anatolia, emergency work for adult refugees was carried on at Mediterranean and Black Sea ports. This included feeding and medical service and resulted in the saving of at least 100,000 lives, chiefly of women and children. Over 22,000 orphans were safely transferred from the interior of Anatolia to new institutional homes in Syria, Palestine, and Greece.

In 1924, the organization was operating 39 orphanage centres and 62 hospitals and clinics in six countries. Its agricultural demonstration projects in Syria, Greece, and Armenia employed 23,000 acres. Industrial training schools in Syria, Greece, and Palestine were teaching 35 trades to 30,000 children.

NEBRASKA. Nebraska is the fifteenth State in size (77,520 square miles) and the thirty-first in population; capital, Lincoln. The population increased from 1,192,214 in 1910 to 1,296,372 in 1920, a gain of 8.7 per cent The white population rose from 1,180,293 to 1,279,219; negro, from 7689 to 13,242. The State has a very large proportion of native white inhabitants, and these increased from 1,004,428 in 1910 to 1,129,567 in 1920. The foreign-born whites, on the other hand, decreased from 175,865 to 149,652. Both urban and rural populations showed an increase, the former from 310,852 to 405,306, and the latter from 881,362 to 891,066. The growth of the principal cities was as follows. Omaha (q.v.), 1910, 124,096; 1920, 191,601; Lincoln, 43,973 to 54,948; Grand Island, 10,326 to 13,947.

Agriculture. As Nebraska is one of the great agricultural States, conditions in the decade 1910–20 reflected the fluctuations in prices and production which resulted from War and post-war conditions. (See AGRICULTURE.) While the population of the State in the decade increased 8.7 per cent, the number of farms decreased 4.1 per cent (from 129,678 in 1910 to 124,417 in 1920). The acreage in farms in 1910 was 38,622,021, compared with 42,225,475 in 1920, an increase of 9.3 per cent; the improved land in farms likewise showed an increase from 24,382,577 acres to 23,109,624, or 5.2 per cent. The percentage of land used for agricultural purposes increased from 78.6 in 1910 to 85.9 in 1920, but the percentage of improved farm land fell from 63.1 to 54.7 per cent. The total value of farm property showed an apparent increase from $2,079,818,647 to $4,201,655,992, or 102 per cent; the average value per farm, from $16,038 to $33,771, or 110.6 per cent. In interpreting these values and indeed all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of

the total of 124,417 farms in 1920, 69,672 were operated by owners, 1315 by managers, and 53,430 by tenants. The comparative figures for 1910 were 79,250, 987, and 49,441. White farmers numbered 124,033 in 1920 and 129,216 in 1910, the native white farmers increasing from 93,509 to 99,441, while foreign-born farmers decreased from 35,707 to 24,592. Of the 384 colored farmers in 1920, 260 were Indians. Farms free from mortgage in 1920 numbered 27,065, compared with 47,435 in 1910; those under mortgage, 35,191, compared with 30,839. The number of dairy cows in 1920 was 516,716, compared with 613,952 in 1910, a decrease of 15.8 per cent; "beef cows," 1,121,564, compared with 705,191, or an increase of 59 per cent; hogs, 3,435,690, compared with 3,435,724; sheep, 573,217, compared with 240,116 The estimated production of the chief farm crops in 1923 was as follows· corn, 257,418,000 bushels; spring wheat, 3,560,000; winter wheat, 28,220,000; oats, 86,977,000; rye, 1,584,000; barley, 9,586,000; potatoes, 9,912,000; hay, 3,352,000 tons; and sugar beets, 541,000 short tons Comparative figures for 1913 are: corn, 114,150,000 bushels; wheat, 62,325,000; oats, 59,625,000; rye, 1,740,000; barley, 1,760,000; potatoes, 5,664,000; and hay, 1,675,000 tons. The apple crop in 1919 was 907,224 bushels valued at $1,905,175, as compared with 3,321,073 bushels valued at $1,612,765 in 1909.

Manufactures. Nebraska is not one of the leading manufacturing States It has, however, five cities with more than 10,000 inhabitants, which in 1920 contained 21.8 per cent of the State's total population and in 1919 reported 81.7 per cent of the State's manufactured products. There were in the State, in 1909, 2,500 manufacturing establishments; in 1914, 2492; and in 1919, 2884. Persons engaged in manufacture numbered 31,966, 33,695, and 49,076; and the capital invested amounted to $99,901,089, $121,007,944, and $245,256,684, in those years. The value of the products in 1909 was $199,018,579; in 1914 $221,615,848; and in 1919, $596,042,498. The large increase in value of the products between 1914 and 1919 was due largely to the change in industrial conditions brought about by the War and cannot properly be used to indicate the growth in manufactures; but the increase in number of wage earners and in number of establishments indicates clearly a decided growth in the manufacturing activities of the State. The principal manufacturing city is Omaha, which had, in 1909, 432 manufacturing establishments, with a product valued at $60,855,000; 1914, 417, with $66,438,000; and in 1919, 561 with $452,237,000. Lincoln is also important industrially, having, in 1909, 167 manufacturing establishments, with a product valued at $7,010,000; in 1914, 195 with $10,025,000; and in 1919, 210 with $23,368,000.

Education. The passage of several legislative acts during the decade 1914–24 did much to improve educational conditions in Nebraska. This is especially true of the latter part of the period. The Legislature of 1919 passed a certification law standardizing the issue of teachers' certifications by establishing specific legal requirements; a law redistricting the State for the purpose of forming consolidated school districts; and a third making citizenship a necessary requirement for teachers in all public, private, denominational, and parochial schools. The Legislature of 1921 made it mandatory for every school district of the State to provide a minimum term of 9 months when it can be supported on a levy of $.008 on $1 of the actual assessed valuation of the school district. The four State normal schools were designated as teachers' colleges by the 1921 Legislature and were authorized to confer the bachelor's degree on students completing the four years' college course. Midland College changed its location from Atchison, Kan., to Fremont, Neb., and Bellevue College, formerly at Bellevue, Neb., was discontinued. The average daily attendance in the schools in 1923 was 253,955, compared with 214,152 in 1914. The total expenditure for public schools for 1923 was $29,935,549. Illiteracy in the State decreased from 2.5 per cent in 1910 to 1.8 per cent in 1920: among the native white population, from 0.8 to 0.5; among the foreign-born white, from 7.1 to 6.6; and among the negro, from 8.5 to 5.7.

Finance. For finance, see STATE FINANCES.

Political and Other Events. During the decade 1914–24, Nebraska was one of the doubtful States, and control was balanced closely between the Democratic and Republican parties. In 1914 John H. Morehead, the Democratic candidate, was elected governor, and the Democrats elected their candidates for Congress in three districts and the Republicans theirs in the others. A woman suffrage amendment was defeated in this election, and so were several other proposed amendments. In 1916 the State was Democratic, both nationally and locally. Keith Neville, Democratic candidate, was elected governor, and Gilbert M. Hitchcock was reelected to the Senate. In the voting for President in this year, President Wilson received 158,827 votes; Charles E. Hughes, 117,771. At this election a prohibition amendment was carried At State elections in 1918, the Republican nominees were elected to the Legislature by large majorities. Samuel R McKelvie was elected governor. An amendment to the constitution was adopted, depriving so-called "first paper declarants," six months resident in the State, of the right to vote. The voters also decided in favor of holding a convention to draft and submit a new State constitution. In October, 1919, there was serious rioting in Douglas County during which the county court house was damaged by fire, with a loss of nearly $1,200,000. The trouble arose from the attempts of the mob to force the sheriff to turn over to them a negro prisoner. The negro was seized by the mob and hanged. In 1920 Governor McKelvie was reëlected. In the voting for president in this year, Warren G. Harding received 247,498 votes; James M. Cox, 119,608. During 1920 a constitutional convention adopted 41 amendments to the constitution which were voted on in a special election on September 22. The most important of these amendments were as follows: The English language was required as a teaching medium in all common schools. The governor was given the power to appoint heads of the executive department, with the consent of the majority of both houses. A budget system was created. The concurrence of five out of seven judges of the Supreme Court was made necessary for declaring a law unconstitutional. No appropriations are made to educational institutions not owned and controlled by the State. In the elections of 1922,

the Democrats were successful. Charles W. Bryan, brother of William J. Bryan, was elected governor. Robert B. Howell, Republican candidate, was elected United States Senator, defeating Gilbert M. Hitchcock, Democrat. The Republicans elected a majority in both houses of the Legislature. Governor Bryan was inaugurated in January, 1923. In the nominating primaries in 1924, Senator Norris, Republican, was renominated. Charles W. Bryan was renominated by the Democrats for governor and Adam McMullen by the Republicans.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. The Legislature of 1917 arranged for the submission of an amendment providing for a revision of the State constitution. The right of women to vote was affirmed for all elections not already specified in the State constitution. Provision was made for the election of the judiciary and certain school officers by nonpartisan ballots. A special session of the Legislature was held in 1918 to deal with issues arising from the War. The so-called Mockett Law, under which the teaching of German was made compulsory in the schools, was repealed. The Legislature in 1919 passed a measure consolidating several boards and commissions under the governor, with the purpose of unifying the administration and doing away with duplications and overlapping jurisdiction. The banking laws were amended and so were the "blue sky" law and the workmen's compensation law A bill was passed for the erection of a new State capitol. The Legislature ratified the Federal prohibition amendment, Jan. 16, 1919, and the Federal woman suffrage amendment, Aug 2, 1919. The Legislature of 1921 passed measures designed to prohibit aliens' acquiring title to land in the State; provided for the preparation and presentation of a State budget and for the establishment of coöperative associations; and declared English the official language of the State, prohibiting discrimination against its use by religious and social bodies. The school age was raised from 14 to 16 years under certain conditions and the age of minority for women to 21 years. A special session of the Legislature was held in April, 1922, to reduce the appropriations made by the Legislature of 1921, in order to avoid the excessive collection of taxes. The total amount of reductions made was about $2,500,000. In 1923 the Legislature passed a measure forbidding the marriage of persons afflicted with certain diseases.

NEBRASKA, University of. A coeducational State institution at Lincoln, Neb, founded in 1869. With the exception of the war years the student enrollment increased steadily from 4133 in 1914 to 5051 in the year 1923–24, with 2569 in the summer session of 1923, not including students of noncollegiate rank and those enrolled in extension courses. The faculty increased correspondingly during the period from 283 to 368 members, and the library from 111,000 to 175,000 volumes. The income of the university rose from $1,000,000 to approximately $3,000,000. Many new buildings were put up. An animal pathology laboratory was built in 1918 and a special State appropriation made available for research in animal diseases. During 1919 and 1920 the following buildings were erected or acquired: on the city campus, Social Sciences Hall, Teachers' College building, Ellen Smith Hall, the chancellor's residence, seven students' houses; on the farm campus, an agricultural engineering building and an animal pathology and hygiene building and a barn; at the Medical College at Omaha, a new laboratory building, nurses' home, and a steam plant. A photographic studio was also added in 1921 and in 1923 a beef cattle barn and a new stadium for athletics and public exercises. Chancellor, Samuel Avery.

NEBULÆ. See Astronomy.

NEGRI SEMBILAN. See Malay States, Federated.

NEGRO IN AMERICA. See Negro Migration; United States, *Population;* Lynchings; and Race Problems in the United States

NEGRO MIGRATION. Following 1916, the northward movement of the southern negro, which had been fairly constant from the close of the Civil War, showed a remarkable increase. Previous to that year negroes in the North had been entirely excluded from most occupations; about three-fourths of the colored workers were employed in domestic personal service; they commanded only poor wages and were largely shut off from the benefits of labor organization. With war-time conditions came a marked broadening of their industrial opportunities. On account of the labor shortage produced by the check to European immigration and the expansion of industry to meet war-time demands, northern employers found themselves compelled to take on negro labor This was, beyond question, the immediate cause of the conspicuous growth in the migration northward. At the same time unrest among negroes in the South and other influences contributed to this movement. In 1918 the total northward migration for the preceding few years was placed between 500,000 and 600,000. This wholesale movement was checked for a time after the War came to an end, although many negroes insisted on coming North even when they were warned that only unemployment awaited them It began again in 1921 and increased through 1922 and 1923. In addition to his war-time experience, the negro had been used to a limited extent as strike-breaker in the steel, building trades, railroad shop, and packing house strikes, where he had an opportunity to prove and to learn his value in industry. Whereas in the South 57.7 per cent of the total number of male negro workers were employed in agriculture, only 5.7 were so engaged in the North in 1920. Moreover, instead of working in hotels, restaurants, office buildings, and domestic kitchens, most of them had become industrial laborers in mills, factories, and stockyards. In Chicago the negro was represented by large or small numbers in practically all the principal occupations. In some cases they had risen to foremanship over men of their own race. Negro women, to a less extent, were being employed in a widening variety of industrial processes. Although in general negroes were not admitted to unions and were employed at lower rates than white workers, in some cases they were asking equal pay for equal work and were joining trade unions where these were open to them. More than all this, perhaps, the negro was finding in the North a freer social and political life with increased educational advantages.

This increased northward migration continuing, the farm labor situation in the South became alarming by the spring of 1923. A temporary reduction in the crop acreage was found necessary. The United States Department of Agriculture, on investigation, found that Georgia had lost, within a year, 32,000 negro farm workers, or 13 per cent of the total number of negro farm workers in that State; Alabama had lost 10,000 or 3½ per cent; South Carolina, 22,700, or 3 per cent; Arkansas, 15,000, or 3½ per cent; Florida, 2, and Louisiana, 1 per cent; besides the negro workers who had been lost to mining, lumbering, manufacturing, and domestic service. According to a study of the census figures, made by the United States Bureau of the Census, the net direct loss to the South through negro migration up to the year 1920 had been 733,571, or approximately 8 2 per cent of its total negro population. The first measure taken in the South to check the movement was rigorous legislation to control emigrant labor agencies; payment of a license fee was required, in some cases as high as $2500, with jail sentences for evasion. The attempt was ineffectual. Higher wages on farms and in factories were offered, improvements were made in school and housing conditions, and efforts were put forth toward securing for the negro equality before the law and an abatement of mob violence, and for some measure of social coöperation between the races. All of this resulted in a betterment of conditions for the negro who remained, but the marked movement to the North continued. The number leaving the South in the year ending Sept. 1, 1923, according to the Department of Labor, was 478,100; the loss by States was as follows: Georgia, 120,000; Alabama, 90,000; Florida, 90,000; Mississippi, 82,600; North Carolina, 25,000; South Carolina, 25,000; Louisiana, 15,000; Tennessee, 10,000; Virginia, 10,000; Arkansas, 5000; Kentucky, 2500; Texas, 2000; and Oklahoma, 1000. To a much larger extent than ever before, the migration came from the far South. Latterly an increasing number of Mexicans were being brought in to meet the farm labor shortage.

The effect of this migration on the population of the North was conspicuous in the census figures. From 1870 to 1910, the average decennial increase of southern negroes in the North was 67,000; in 1910–20 the increase was 321,890, or more than the aggregate increase of the preceding 40 years. In 1910 the negroes had constituted about 1.9 per cent of the total population of the North, at which point it had been fairly constant since 1870; in 1920, their proportion had increased to 2.3 per cent. This increase, however, though striking, was not enough in itself to make the negro a disturbing factor in the North. Where trouble arose it was from the unequal distribution of the negro population. Nine States, holding 72.7 per cent of the total population of the North, accounted for 91.4 per cent of the total negro population of that territory (Pennsylvania, 284,568; New York, 198,483; Ohio, 186,187; Illinois, 182,724; Missouri, 178,241; New Jersey, 117,132; Indiana, 80,810; Michigan, 60,082; Kansas, 57,925). Most serious was the concentration in the large cities; New York, Chicago, and Philadelphia, for example, contained 26.9 per cent of the northern negroes, as compared with 15.9 per cent of the total population. The influx of negroes to the larger cities appeared to be taking on flood proportions. In protest against the employment conditions resulting from the movement, East St. Louis rioted in 1917. Serious race riots broke out in Chicago, in 1919, in which there were killings on both sides. There were disturbances in Omaha and Washington. These outbursts of race feeling were precipitated largely, it was claimed, by sensational newspaper publicity, and in Chicago in particular by the difficulties of insufficient housing. It being realized, however, that lack of understanding and coöperation between the races was the crux of the situation, and that this was only being aggravated by political as well as social segregation, there was appointed in 1918, under the Federal Department of Labor, a director of negro economics, to ease the friction. Negro advisory committees, composed of representative white and colored citizens, were established throughout the South and in various northern centres, constituting agencies in which the two elements might work together toward a mutual understanding. In industry, the negro immigration was in a limited measure taking the place of the foreign-born as a source of labor supply for shops and factories. There had been fewer cases of open hostility between white and colored labor than had been anticipated; requests for separate facilities had not been frequent The American Federation of Labor made an effort to prevent the drawing of the color line in the unions; and when several international and local unions refused to accept this principle, it provided in 1920 that where internationals refused to admit colored workers to membership, organization would be authorized under a charter of the Federation. The Federation also sent an organizer to work among the negroes in the South. The attitude of the white worker in general seemed to be that while he was averse to the negro in industry, still, since the negro had come, it was better to have him organized. It was noteworthy that during the Chicago riots, the organized white workers in the packing houses guaranteed that there would be no trouble between them and the negro workers. See LYNCHINGS.

NEIHARDT, JOHN GNEISENAU (1881–). An American writer, born at Sharpsburg, Ill. He studied at the Nebraska Normal School and from 1901 to 1907 lived among the Omaha Indians to study their character and history. His books include *The Divine Enchantment* (1900); *The Lonesome Trail* (1907); *The Dawn Builder* (1911); *The Quest*, poems (1916); *The Song of Three Friends* (1919); and *Two Mothers*, a drama (1921). *The Song of Three Friends* was awarded a prize by the Poetry Society of America as the best volume of verse of 1919. He edited several collections of verse and contributed frequently to magazines. From 1912 he was literary critic of the Minneapolis *Journal*.

NEJD, EMIRATE OF. See ARABIA.

NELSON, KNUTE (1845-1923). An American lawyer and legislator (see VOL. XVI). He was a member of the Senate for five successive terms and was reëlected for the term ending 1925. At the time of his death, on Apr. 28, 1923, he was the oldest member of that body in point of service. He died on Apr. 28, 1923.

NEO-LAMARCKIAN THEORY. See HEREDITY.

NEPHRITIS. Ideas of the nature of

Bright's disease underwent much change in the decade 1914–24. Thus it was pretty well shown through experiment that nephritis does not represent a poisoning through the exposure of the organs in eliminating toxic material. This kind of injury, which may be studied in actual poisoning by mercury and oxalic acid, bears no resemblance to ordinary nephritis. The latter may usually be traced to a focus of infection somewhere in the body, as in the teeth or tonsils, while the organs are also attacked by the germs and their toxic products in various general infections. No doubt dietetic and other abuses may lower the resistance of the organs to infection. Passage of the prohibition amendment in the United States had not secured any lowering of the mortality of Bright's disease up to 1924, and it must be borne in mind that chronic disease of vital organs late in life is common among the clergy as well as in other abstinent classes of mankind.

The old distinction between medical and surgical nephritis is no longer upheld, for a unilateral nephritis, once thought to be the necessary result of mischief lower down in the urinary tract, may be found due to a blood infection. There seems to be very little difference between the causal factors in nephritis proper and those of disease of the kidney and the pelvis, perinephritis, and even stone in the kidney; for focal infection may be traced in all of them. Under diagnosis the practice of microchemical analysis of the blood will give the best idea of the functional efficiency of diseased kidneys. Convulsions seen in uræmia are no longer regarded as the result of retained toxic material in the blood but as that of increase in intracranial pressure. For the relief of nephritis wonders may be accomplished by proper diet, as in the case of the disappearance of dropsy on a diet very poor in salt

NERNST DISTRIBUTION LAW. See CHEMISTRY, PHYSICAL.

NERNST HEAT THEOREM. See CHEMISTRY, PHYSICAL.

NETHERLANDS, THE, or HOLLAND. A kingdom situated on the North Sea, lying between the Kingdom of Belgium on the south and west and Germany on the east. Its area is 13,205 square miles, of which 617 consist of water. The population in 1923 was 7,086,913 (49.64 per cent male and 50 36 per cent female), an increase of 109,483 over the census of 1921 and 221,599 over that of 1920. The density of population per square mile amounted to 652.99 The urban population constituted 45.66 per cent of the whole, and the rural 54.34 per cent. Emigrants in 1922 amounted to 2158, of whom 1912 departed from Dutch ports for North America, 195 for South America, and 47 for Africa. The royal family and most of the inhabitants were members of the Reformed Church, which was under Presbyterian government, but complete liberty of conscience was granted to all religions. At the end of 1920, there were 2,826,633 adherents of the Dutch Reformed Church; other Protestants numbered 832,164; Catholics, 2,444,583; Jansenists, 10,461; Jews, 115,222; other known creeds, 635,241. The chief cities with their population in 1923 were: Amsterdam, 700,303; Rotterdam, 535,033; The Hague, 367,667; Utrecht, 146,976; Groningen, 94,217; and Haarlem, 80,383.

Agriculture. The total area of agricultural land (in hectares; 1 hectare = 2.47 acres), in 1922 was 2,229,413 (in 1913, 2,186,591); arable land, 902,266 (27.61 per cent; 882,255 hectares in 1913); meadows, 1,231,052 (37.67 per cent; 1,221,876 in 1913); gardens and orchards, 96,095 (2.94 per cent; 81,460 in 1913); forests, 248,208 (7.6 per cent; 257,939 in 1913); uncultivated land, 466,066 (14.26 per cent; 515,143 in 1913).

PRINCIPAL CROPS, 1922

(1 bushel = .35238 hectoliter)

	Hectares 1922	Hectoliters 1922	Hectoliters 1915
GRAINS			
Oats	159,441	6,279,000	7,292,000
Rye	202 168	6,040,000	5,679,000
Wheat	60,551	2,171,000	2,498,000
Barley	24,899	1,108,000	1,191,000
MISCELLANEOUS			
Potatoes	192,884	57,204,000	44,663,000
Sugar (beet) (metric tons)	55 956	1,818,000	1,714,000
Peas	32,222	914,000	641,000
Beans	21,315	651,000	430,000
Flaxseed	9,694	88,000	101,000
Canary seed	1,084	33,000	22,000

Live stock and poultry (1921 and 1910): horses, 363,668 and 327,377; cattle, 2,062,771 and 2,026,943; sheep, 668,211 and 889,036; pigs, 1,519,245 and 1,259,844; chickens, 9,660,800 and 6,709,593.

Imports and Exports of Foodstuffs. Imports of grain for 1923 totaled 1,783,397 metric tons, of which 637,863 came from the United States, as compared with 1,710,419 of which 1,012,850 came from the United States in 1922; imports of flour were 146,299 metric tons, of which 126,787 came from the United States, as against 163,625 of which 84,325 came from the United States in 1922. The export of dairy products amounted to 198,110 metric tons in 1923, as against 181,916 in 1922; this was destined chiefly for Great Britain Exports of loaf sugar amounted to 210,763 metric tons as

PRODUCTION STATISTICS, 1921

Factories	Number	Production (in guilders)
Cocoa and chocolate	50	55,842,869
Cocoa Powder	43	12,710,198 kg.
Cocoa butter	33	6,232,354 "
Shoe	349	40,796,088
Soft soap	40	35,245,761 kg.
Hard and liquid soap	37	8,570,282 "
Soap powder	29	15,231,901 "
Potato flour, dextrine glucose, and syrup	40	27,563,297
Electrical machinery and appliances	36	12,858,020
Metal ware	35	11,301,873
Bolt, nuts, rivet and screw	19	10,123,558
Tin ware	11	7,387,607
Metal, smelting and bottle cap	18	7 285,334

PRODUCTION STATISTICS, 1920

Factories	Number	Production (in guilders)
Flour	31	192,541,666
Tile	107	56,653,014
Brick	408	46,725,396
Breweries	232	35,926,210
Lime and sandstone	16	3,552,786
Motor	61	3,085,044
Ice	37	1,640,717
Malt	8	1,195,921

against 197,615 in 1922; this, too, was exported principally to Great Britain.

Mining and Manufacturing. Mining was limited in the Netherlands to coal mining in the province of Limburg. The coal production was estimated at 5,500,000 metric tons for 1923, against 4,570,000 for 1922 and 3,018,000 in 1917. In 1923 there were 933 dairies. The production of butter in 1922 amounted to 64,633,000 kilograms, and of cheese, 97,621,230 kilograms. The beet sugar refineries numbered 21 in 1922, while the total sugar production amounted to 175,331 metric tons for 1922–23. In 1922 there were 33 potato flour factories, 18 cardboard factories, and 16 margarine factories. The latter produced 87,902,720 kilograms of margarine.

Communications. Length of railways in 1923 was 3671 kilometers; in 1922, 3428; in 1910, 3215. The estimated receipts were 120.43 florins per kilometer for 1923, as against 130.87 florins for 1922. In 1923 there were 666 steamers (2,398,618 gross registered tons), against 664 for 1922 (2,164,739 gross registered tons); motor and motor sailing vessels, 80 (63,940 gross registered tons), against 73 for 1922 (51,351 gross registered tons).

TONNAGE ENTERED AND CLEARED AT ROTTERDAM AND AMSTERDAM (1923)
(In cubic meters)

	1922	January–November, 1923
Total Entries	44,099,955	40,669,545
Rotterdam	33,792,324	29,865,048
Amsterdam	8,509,459	8,817,824
Total Clearances	28,468,683	28,485,391
Rotterdam	21,435,815	20,876,426
Amsterdam	5,513,201	6,040,892

RIVER SHIPPING (1923)
(In 1000 kilograms)

	1922	January–November, 1923
Total Entries	16,931,645	11,105,351
Through Lobith	10,361,740	5,193,379
Total Clearances	21 972,497	16,061,245
Through Lobith	13,241,713	7,691,242

Idle tonnage at the end of 1923 totaled 38 ships (221,000 gross registered tons) against 76 (317,000 gross registered tons) for 1922 The movement of merchandise, in metric tons, was as follows:

	1922	1923
Total		38,345,769
By ocean		23,294,849
By river and canal		16,050,920
Rotterdam:		
Total	31,016,337	23,658,178
By ocean	18,981,585	15,677,725
By river and canal	12,034,752	7,980,453
Amsterdam:		
Total	5,354,990	5,111,925
By ocean	4,120,727	4,230,243
By river	1,234,263	881,682

Commerce. The foreign trade in 1923 totaled, in imports, 2,009,225,705 guilders, against 2,027,598,760 for 1922 and 608,357,000 in 1918. Exports showed 1,303,220,602 guilders, against 1,221,231,211 for 1922 and 381,210,000 in 1918. Transit trade showed 8,767,840 metric tons against 13,296,287 for 1922.

PRINCIPAL IMPORTS AND EXPORTS

Article	Quantity (metric tons) 1922	1923	Value (1000 guilders) 1922	1923
IMPORTS				
Coal	6,216,044	6,386,716	102,508	113,786
Wheat	541,299	566,400	72,914	68,275
Corn	879,506	710,114	78,256	67,115
Lumber (pine)	1,045,710	994,871	68,058	66,406
Copran	173,655	147,545	48,796	46,878
Cotton yarn	32,740	25,726	50,729	46,752
Linseed	248,612	195,946	51,834	41,650
Coffee	55,779	50,176	46,515	41,159
Cotton, raw	20,807	19,006	26,945	82,052
Barley	143,918	283,751	15,259	25,088
EXPORTS				
Cotton piece goods	21,230	23,714	74,621	82,825
Sugar, loaf	197,615	210,763	50,595	71,475
Cheese	65,213	61,982	53,626	54,226
Margarine	59,163	76,277	36,246	49,620
Coal	2,256,017	2,850,756	38,262	52,655
Butter	23,125	23,936	44,125	41,330
Milk, condensed	84,674	98,670	33,567	40,346
Pork	28,524	33,557	29,911	34,251
Coconut oil	83,215	65,817	36,303	31,607
Flower bulbs	24,081	21,951	22,641	26,383

FOREIGN TRADE BY COUNTRIES

Countries	(in 1000 guilders) Imports from 1922	1923	Exports to 1922	1923
Germany	608,437	494,868	167,775	186,790
Great Britain	323,569	308,222	302,969	359,600
United States	270,799	256,017	62,094	69,452
Belgium	187,966	215,260	174,176	139,328
Dutch East Indies	102,373	114,184	127,382	110,850
France	57,290	68,744	114,525	126,115

Leading imports from the United States for 1923 (in 1000 guilders) were wheat, 33,970; raw cotton, 28,092; corn, 22,157; linseed cake, 20,092; wheat flour, 20,992. Leading exports to the United States were flower bulbs, 9560; rubber, 3885; silk, artificial yarns, 3590; quinine and other salts, 3018; chincona bark, 2392.

Finance. The national debt, consolidated (Jan. 1, 1923), was 2,828,319,550 guilders; floating (December, 1923), 648,856,000 guilders, of which 102,256,000 were advanced to the colonies, against (December, 1922) 805,937,000 guilders, of which 323,750,000 were advanced to the colonies.

NATIONAL BUDGET, 1923 AND 1924
(Estimated)
(In 1000 guilders)

Year	Ordinary	Extraordinary	Crisis	Total
Expenditure				
1923	620,397	183,999	3,829	808,225
1924	646,892	112,634	5,737	765,264
Revenue				
1923	567,696	14,210		581,907
1924	548,628	40,793		589,422

ACTUAL RECEIPTS, 1922 AND 1923
(In 1000 guilders)

Revenue	Ordinary	Extraordinary	Crisis	Total
1922	468,769	132,136	31,542	632,447
1923	428,866	106,781	13,566	549,213
Decrease	39,903	25,355	17,976	83,234

The following indicates currency in circulation:

Date	Gold	Silver	Note Circulation
Dec 31, 1922 . .	581,790	9,074	969,251
Dec 31, 1923 . .	.581,787	8,674	1,031,279
Feb. 4, 1924 . .	.581 713	10,120	1,030,419

The exchange for the dollar (par, 2.488 guilders to $1) was in December, 1922, 2.51; in December, 1923, 2.63; on Feb. 2, 1924, 2.65. The wage index (January, 1914 = 100 for five cities and 14 classes of workers) was 246.4 for July, 1923, against 265.2 for July, 1921, and 252.3 for January, 1923 The average hourly wage (first half of 1923 in 14 industries of Amsterdam, in Dutch cents) was: skilled, 83, semi-skilled, 70; unskilled, 69. Municipal wages (1923) were: miners (below the surface) 6.43 florins per shift; (above the surface) 4.33 florins per shift; gas workers, 0.76 florin per hour; electrical workers, 0.80 florin per hour; metal workers, 0.62 florin per hour; building workers: masons, 1 09 florins per hour; carpenter, 1.01 florins per hour; assistant mason, 0.92 florin per hour; gun workers, 0.75 florin per hour; munitions and explosive workers, 0.68 florin per hour; construction workers, 0 81 florin per hour. Collective wage agreements numbered 498 for January–November, 1923, against 500 for 1922 Strikes and lockouts were 257 for January–November, 1923, against 308 for 1922. There were 3883 commercial failures for January–November, 1923, against 3403 for 1922. Unemployed workers numbered 102,225 on Dec. 31, 1923, against 106,528 on Dec. 31,1922, principally in the metal and building trades; a total of 110,268 sought unemployment aid on Jan. 26, 1924. The wholesale price index (1913 = 100 for 48 articles) was 151 for 1923, against 160 for 1922 and 182 for 1921. The retail price index (1913 = 100 for 17 articles in six cities) was 145 for 1923, against 157 for 1922 and 179 for 1921.

History. The political history of the Netherlands during the War was the familiar tale of neutral nations: to remain aloof from the struggle by word and deed, to render what aid was possible to the unfortunate victims of the War, to carry on the usual international relations as far as might be, and at the same time to supply the daily wants of the population in spite of the sadly disrupted state of the world, were the concerns of the Dutch in the years 1914–18. The outbreak of the War brought the whole military strength of Holland into the field. By Aug. 4, 1914, 200,000 men were under arms, and as hostilities progressed and the work of policing the coasts and the frontiers increased, more units were called up, so that at its height the Dutch army totaled 400,000 men. The expense, necessarily, was enormous for so small a country. In December, 1914, a loan of $100,000,000 had to be floated to meet the costs of the establishment. In all a debt of more than $750,000,000 was incurred which could be wholly attributed to the War, i.e. for the upkeep of the army and navy, the care of refugees and interned soldiers, etc. The martial character of the country became more striking year by year. In 1915 all workmen engaged in the manufacture of munitions were placed under martial law, and a check was put on their goings and comings; later in the year, the ever-present threat of invasion prompted the government to declare a state of siege in some of the communes of north Holland and also in some parts of Amsterdam. Not until the Armistice did Holland dare relax her vigilance, and then the threat of mutiny among the soldiers hastened demobilization sooner than the government might have wished. The problem of the returning soldiers, in view of the disorganization of industry and the dearth of housing, contributed greatly to the trials of the state. The feeding of the population and the providing of industry with the raw materials necessary for its operation were perhaps Holland's most pressing problems. Normal activity was dependent on keeping the regular channels of trade clear Having become a country of truck farmers and cattle breeders, Holland of necessity depended on Germany for her coal and iron and on France, Great Britain, and the United States for her foodstuffs and textiles. A brisk overseas and land trade was carried on with all these as well as with Switzerland, Italy, and Austria-Hungary. The War curtailed intercourse on land, except with Germany; and the British blockade and the German submarine policy as well as American seizure of Dutch ships in 1918 played havoc with the Dutch merchant marine. More and more, Holland was put at the mercy of belligerents, and only the conclusion of the War checked the progress of the famine gripping her people. Extraordinary administrative measures had to be taken. In 1914 and 1915 the export of cereals and flour, cotton, rice, and linseed was prohibited. In 1915 the Netherlands Overseas Trust was formed for the purpose of handling imports. Before Great Britain and France would give their consent to the maintenance of the usual trade relations, it was necessary for the Trust to give assurances that the articles imported would not be reshipped to Germany. In 1916 the scarcity of flour forced the prohibition of the baking of white bread; maximum prices for cereals were fixed. The dislocation of trade with the Dutch East Indies compelled the government to maintain a strict surveillance over the distribution of foodstuffs and fodder What little prosperity there was grew out of the maintenance of relations with the Central Powers; Germany and Austria took Holland's vegetables and dairy products, and Germany, in turn, sent coal and iron.

In a situation of such complex relations the rise of irritations and misunderstandings was inevitable. Clashes with Germany and the Allies were frequent. During 1915–17, notes were interchanged frequently with Germany over the violation of Dutch neutrality by the landing of airships, the stopping of merchant vessels, and the mining and torpedoing of Dutch ships; in 1918, feeling ran high over the British and American seizure of Dutch ships. And yet, in spite of vexations of this character and personal distress due to the hardships of the War, the Dutch worked unsparingly in the interests of their less fortunate neighbors. The invasion of Belgium sent into Holland some 1,200,000 refugees who were clothed and fed for varying lengths of time. By the end of the War there were still about 30,000 such refugees partaking of the hospitality of the Dutch. Interned soldiers at times numbered as many as 50,000, most of them Belgians, but also many Russian and German deserters. The Dutch Red Cross

did yeoman work in facilitating the exchange of British and German prisoners. In all these humanitarian activities the government must have expended $25,000,000, while private contributions easily reached a similar amount.

These preoccupations did not check civil and political developments of extraordinary importance. By the electoral reform act of Dec. 12, 1917, universal suffrage and proportional representation were established. Sex disabilities of women were likewise removed. In 1917, by a constitutional amendment, the government was ordered to provide for the upkeep of denominational as well as secular schools. As a result of an increasing labor agitation during the War, a series of enactments was promulgated in 1919 which aimed at better social and working conditions. By these laws, the eight-hour day was assured in factories and offices; workmen's insurance was extended to all industries except agriculture and navigation; the general supervision of health activities was turned over to a state health council; a council of labor was erected to advise generally all administrative departments in the conduct of labor affairs. But the inability of affairs to mend, in spite of paternalistic legislation, increased the insurgency of the labor classes. In 1918 and 1919, under the leadership of Troelstra, the Social Democrats pressed for a political revolution, some even demanding the abdication of the Queen. Continued hard times brought on a serious dock strike during February–April, 1920, and such outbreaks were frequent in the subsequent years. The threat of proletarian control forced the union of most of the elements of the Right with the result that a Catholic government was constituted in 1918, for the first time, under Jonkheer Ruys de Beerenbrouck. The elections of 1922 for the second chamber returned 32 Catholics, 20 Social Democrats, 16 Antirevolutionists, and some others, so that the Beerenbrouck ministry continued in power by the support of the Right bloc.

After the War the country was plunged more deeply into the stormy sea of foreign relations. On Nov. 10, 1918, the Dutch were unpleasantly surprised by the presence of the former Kaiser in their midst. His stay at Amerongen was unmolested, and in spite of demands from the Allies for his extradition in 1920, the Dutch government refused to yield him up. All other questions yielded precedence to the demand of Belgium for the revision of the treaties of 1839. Belgium, in effect, desired sovereignty over the western Scheldt as well as the district of southern Limburg on the east. Belgium sought the left bank of the Scheldt for the further development of Antwerp; Limburg (q.v.) was desired for strategic and economic reasons. For the consideration of the question the Supreme Council in 1919 created an international commission, but it circumscribed that body's activities by indicating that it would refuse to countenance any transfer of territory. The disputants were advised to come to an amicable understanding over the matter of waterways. In 1920 an agreement was reached on the administration of the Scheldt, the Antwerp-Meuse-Rhine canal and two other water systems. Further difficulties arose, however, with Belgium's insistence that the disposition of the Weilingen at the entrance to the Scheldt, for the pass controlled the port of Zeebrugge, be also considered. On this no agreement could be reached. There were other international concerns to occupy the attention of the Dutch in this period. In 1920, Holland joined the League of Nations. On Dec. 23, 1920, after heated debate, the Parliament voted to resume relations with the Vatican. These had terminated in 1907. In the same year, although it formally refused to open commercial relations with Russia, the Foreign Office indicated that it would not interfere with business transactions. In 1922, Holland welcomed to The Hague the Permanent Court of International Justice which had been created by the League of Nations. The question of the defense of the Dutch East Indies agitated the people profoundly during 1920–23. In 1921, the Queen's address from the throne included a request for the strengthening of the fleet, and the proposal was backed up by the resolution of the Indian Council. In 1922 the government laid before the second chamber an ambitious programme of naval construction. (See NAVIES OF THE WORLD.) The measure was stubbornly contested in 1922 and 1923. Its opponents showed that it meant an additional cost to Holland of $14,000,000 yearly for 12 years, and to the colonies of $20,800,000 for the same term. Nevertheless it was only after a bitter struggle that profoundly shook the whole kingdom that the naval bill was rejected, Oct. 26, 1923, by a vote of 50 to 49. The Ruys de Beerenbrouck cabinet now resigned. The inability of the three parties of the Right to reach an agreement compelled the Queen, after a three-month suspension of governmental activities, to recall de Beerenbrouck in January, 1924.

NETHERLANDS INDIA. See DUTCH EAST INDIES.

NEUILLY, TREATY OF. See PEACE CONFERENCE AND TREATIES.

NEUROSES. See PSYCHOLOGY, ABNORMAL.

NEUTRALS IN THE WAR. See WAR, DIPLOMACY OF THE.

NEUTRODYNE. See RADIO TELEPHONY.

NEVADA. Nevada is the sixth State in size (110,690 square miles), and the forty-eighth in population; capital, Carson City. The population decreased from 81,875 in 1910 to 77,407 in 1920, a loss of 5.5 per cent. The white population fell off from 74,276 to 70,699; Indian, from 5240 to 4907; negro, from 513 to 346; native white, from 56,277 to 55,897; foreign-born white, from 17,999 to 14,802. The urban population of the State rose from 13,367 to 15,254, while the rural population decreased from 68,508 to 62,153. The only important city in the State is Reno, with 10,867 inhabitants in 1910, and 12,016 in 1920.

Agriculture. Nevada is, agriculturally, one of the least important States, although its agriculture is second only to its mining, and no other industry approaches it. The population of the State decreased 5.5 per cent in the decade 1910–20, but the number of farms increased 17.6 per cent (from 2689 to 3163). The acreage in farms decreased from 2,714,757 to 2,357,163 in 1920, or 13.2 per cent; and the improved land in farms, from 752,117 to 594,741 acres. The percentage of land used for agricultural purposes was 3.9 in 1910 and 3.4 in 1920. The total value of farm property showed an apparent increase from $60,399,365 to $99,779,606, or 65.2 per cent; the average value per farm, from $22,462 to $31,546, or 40.4 per cent. In interpreting these values and indeed all com-

parative values in the decade 1914–24, the inflation of currency in the latter part of the period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 3163 farms in 1920, 2699 were operated by owners, 168 by managers, and 296 by tenants. The comparative figures for 1910 were 2175, 181, and 333. White farmers in 1920 numbered 2944, compared with 2528 in 1910. In 1920, native white farmers numbered 2060, compared with 1661 in 1910; foreign-born white farmers, 884, compared with 867. Colored farmers in 1920 numbered 219, of whom 208 were Indians; in 1910, 161, of whom 148 were Indians. Farms free from mortgage in 1920 numbered 1599, compared with 1805 in 1910; those under mortgage, 884, compared with 361. The number of dairy cows decreased from 17,084 to 16,482; "beef cows," from 210,546 to 189,960; sheep increased from 824,875 to 880,580. The area under irrigation in 1919 was 561,447 acres; in 1909, 701,833. The estimated production of the chief farm crops in 1923 was as follows: corn, 31,000 bushels; wheat, 507,000; oats, 122,000; barley, 226,000; potatoes, 698,000; and hay, 473,000 tons Comparative figures for 1913 are: corn, 34,000 bushels; wheat, 1,081,000; oats, 473,000; barley, 492,000; potatoes, 1,760,000; and hay, 646,000 tons

Mining. The most important mineral products of the State are silver, gold, gypsum, and copper Silver, which is the most important mineral, showed a considerable decline in the decade 1914–24; in 1914 the production was 15,455,491 fine ounces; 1915, 14,459,840; 1916, 13,837,525; 1917, 11,269,969; 1918, 10,000,599; 1919, 6,863,580; 1920, 7,745,093; 1921, 7,083,782; and 1922, 8,619,587. The value of the gold produced also decreased sharply in the decade; the output in 1914 was valued at $11,481,188; 1916, $8,866,237; 1918, $6,619,937; 1920, $3,566,728; and 1922, $3,297,384. Copper showed an increase in the middle of the decade but declined sharply in the later years; the production in 1914 was 60,986,450 pounds; 1916, 105,116,813; 1918, 116,316,441; 1920, 50,559,763; 1921, 10,961,491, and 1922, 23,133,091 The small output in 1921 was due chiefly to the business depression, which caused a decrease in the demand for copper. The production of gypsum during the decade ranged from 100,000 to 175,000 short tons per year, with a value in excess of $1,000,000. In addition to the minerals mentioned, the State also produces lead, manganiferous ore, and zinc, but in comparatively small quantities. The total value of the mineral products in 1921 was $14,038,071; $25,648,961 in 1920; $24,457,735 in 1919; $51,080,169 in 1918, and $29,984,338 in 1914.

Manufactures. See UNITED STATES, *Manufactures.*

Education. The educational problem of Nevada is made difficult by the State's sparse population and its vast area. In spite of these difficulties, the progress of education in the decade 1914–24 was constant. Efforts were made toward the consolidation of schools and the development of vocational education. The Legislature passed many measures which greatly aided the administration of the educational system. Vocational education is administered by the Director of Vocational Education and Industrial Rehabilitation, who is also supervisor of trade and industrial education. The object in vocational education has been to reach, through a coöperative spirit, as large a number as possible of persons who may be benefited by the various types of instruction offered, in order that the productive industries of the State may be encouraged and the intelligence of those employed in the trades and other industrial pursuits may be increased; and efforts toward these objects have been successful. The cost of education in the State from 1912 to 1920 increased greatly; in 1912 the cost per pupil was $76.38; in 1920, $128.22; allowance is to be made, of course, for the decreased purchasing power of money. A high-school system was developed efficiently. The total enrollment in the schools in 1913 was 13,622; in the elementary schools in 1922 it was 11,518, and in the high schools, 2389. The total maintenance cost in 1922 was $1,381,752; in addition to this there was a permanent investment of more than $400,000 in grounds and buildings, making a total expenditure for elementary and high schools of $1,784,831, or $122.74 per census child in the State. Illiteracy in the State decreased from 6.8 per cent in 1910 to 6.7 per cent in 1920. Among the native white population it increased from 0.3 to 0.5 per cent; among the foreign-born white, from 7 to 8.5; among the negro, it decreased from 6 to 4.7.

Finance. For finance, see STATE FINANCES.

Political and Other Events. In the decade 1914–24, political control in Nevada fluctuated between the Democratic and Republican parties. In 1914 elections were held for governor, Senator, and Representatives to Congress. The Democratic candidate for governor, Emmet D. Boyle, was elected, defeating Gov. Tasker L. Oddie. Senator Newlands was reëlected, while the Republicans elected a Representative to Congress. At this election an amendment providing for woman suffrage was adopted. In 1916 the Democrats had the predominance of strength and elected Key Pittman United States Senator. In the presidential voting of this year, President Wilson received 17,776 votes; Charles E. Hughes, 12,127. In this election, for the first time in the history of the State, women cast votes for President. The Democrats were again successful in 1918, reëlecting Governor Boyle. Senator Newlands died in 1918, and Charles B. Henderson was appointed to fill the office until the election of his successor. The Republicans returned to power in 1920, electing T. L. Oddie, former governor, United States Senator. A woman, Anne Martin, was the Senatorial candidate on an independent ticket, the first woman candidate for this office. In the presidential voting of this year, Warren G. Harding received 15,479 votes; James M. Cox, 9851. In the elections of 1922, there was a political reaction, and the Democrats elected every State official except one. James W. Scrugham, the Democratic candidate for governor, was elected, and Senator Pittman was reëlected to the Senate. The Supreme Court in 1923 declared unconstitutional the prohibition act passed by the Legislature in that year. On July 6, 1923, a fire at Goldfield resulted in the death of one person and a property loss of more than $500,000. At a State Republican convention in May, 1924, the nine delegates of the State were pledged to vote for President Coolidge at the national convention.

Legislation. The most important acts of

the Legislature in the decade 1914–24 are noted below. The Legislature, in February, 1915, passed a so-called "easy divorce bill," restoring the six months' residence requirement which had been abolished by the Legislature of 1913. The Legislature of 1919 provided for a budget and passed measures providing for an eight-hour day on public works. It also passed statutes defining and punishing criminal syndicalism and sabotage. In 1921 the Legislature created town-planning commissions for incorporated cities and towns, declared oil pipe lines to be common carriers, and made provision for the teaching of thrift in the public schools. A bill for capital punishment by lethal gas instead of by hanging or shooting was signed by Governor Boyle on Mar. 28, 1921, and on February 8, 1924, Gee Jon, a Chinese convicted of murder, was executed by this method. In 1923 the Legislature repealed the State prohibition law which had been declared unconstitutional and substituted a measure corresponding to the Volstead Act. It also granted equal rights in the guardianship of children to women, extended the absent voter privilege to persons who because of physical disability expect to be confined to their homes on Election Day, made the possession of drugs illegally obtained a crime, passed a uniform trading act, enacted a modified old age pension law, and created a small claims court.

NEVADA, UNIVERSITY OF. A coeducational State institution at Reno, Nev., founded in 1874. The student enrollment of the university increased from 340 in 1914 to 825 in the year 1923–24, with 134 in the summer session of 1923. During the decade the faculty likewise increased from 50 to 62 members. The library rose from 28,000 bound volumes in 1915 to 38,843 in 1923. An agricultural building was constructed in 1918, an educational building in 1920, and a building to house the Federal Bureau of Mines' Rare and Precious Metals Experiment Station in 1921. Walter E. Clark, Ph.D., LL.D., succeeded Archer Wilmot Hendrick as president in 1917.

NEVIN, ARTHUR FINLEY (1871–). An American composer, born at Edgeworth, Pa. Having received his first musical education from his father, he entered the New England Conservatory in 1891, studying with O. Bendix (piano) and P. Goetschius (theory). From 1893 to 1897 he studied in Berlin with Klindworth, Jedliczka (piano), and Boise and Humperdinck (composition). He then returned to Edgeworth, where he lived until 1910, devoting his time to composition and teaching. In 1903–04 he spent some time with the Blackfeet Indians in Montana, collecting their melodies and legends. There he found the subject for his Indian opera *Poia*, which was produced at the Royal Opera in Berlin (1910), the first work of an American composer ever brought out at that institution. In 1915–20 he was professor of music at the University of Kansas, and in 1921 he became director of municipal music at Memphis, Tenn. He also wrote two other operas, *The Daughter of the Forest* (Chicago, 1918) and *Twilight* (not produced up to 1924); a masque, *A Night in Yaddo-Land;* two cantatas, *Roland* and *The Djinns;* three orchestral suites, *Miniature, Lorna Doone,* and *Love-Dreams; Bakawali Dances* for orchestra; a string quartet and a piano trio; and piano numbers and songs.

NEVINSON, HENRY WOOD (?–). An English newspaper correspondent and writer. He was correspondent for the *Daily Chronicle* in the Greco-Turkish War of 1897, traveled much in Spain, Africa, and elsewhere in the years following, and reported for various newspapers campaigns in Morocco and the Balkans in 1912. He was accredited by the War Office as official correspondent at the Dardanelles for several papers and was wounded during operations there. He was later correspondent with the British armies in Salonica, Egypt, France, and Germany. He was editorial writer for several important papers and wrote much on politics and other subjects. His books include: *The Thirty Days' War* (1898); *Books and Personalities* (1905); *The Dawn in Russia* (1906); *The Dardanelles Campaign* (1918); *Lines of Life* (1920); *Essays in Freedom and Rebellion* (1921); and *Changes and Chances* (1924).

NEW, HARRY STEWART (1858–). A Postmaster General of the United States, born at Indianapolis, Ind., and educated at Butler University. He began as a reporter on the *Indianapolis Journal*, and from 1878 to 1903 he was editor, part owner, and publisher of that newspaper. He served in the Spanish-American War. In 1896 he was elected to the Indiana State Senate for four years, and from 1900 to 1912 he was a member of the Republican National Committee. In 1917 he was elected to the United States Senate and served till 1923, when he was appointed Postmaster General by President Harding.

NEWARK. The largest city in the State of New Jersey. The population rose from 347,469 in 1910 to 414,524 in 1920 and to 438,699 by estimate of the Bureau of the Census for 1923. The 250th anniversary of the city was celebrated during five months of 1916 with an historical pageant, a prolonged music festival and an exhibit of local industries. A memorial building was erected by the city at a cost of $1,500,000 to mark the occasion, and a copy of Verrocchio's equestrian statue of Bartolommeo Colleoni, executed by J. Massey, was given to the city by Christian Feigenspan. The city-planning commission in 1915 offered a comprehensive plan for the city of Newark, and a zoning plan in 1919. The northeast wing of the city hospital was built in 1915; a site for the Newark museum was bought in 1922 and $500,000 given by Louis Bamberger towards the $625,000 necessary for the building. A new two-story city market building covering two acres, with an open paved farmers' market of three acres, was finished in 1923 at a cost of $5,100,000. Port development also proceeded rapidly, especially along the tidal meadows known as Port Newark. Between 1913 and 1924, the city spent $6,000,000 reclaiming, filling and developing a large area of the meadows and constructing a channel 30 feet deep and 400 feet wide. During the War about half the Port was taken over in the interest of the Federal government, which built warehouses for use as army bases at a cost of upwards of $13,000,000. The Submarine Boat Corporation, which received a subsidy from Congress of $17,000,000, built 150 steel merchant vessels during the War from their shipyards on the reclaimed land; two other shipbuilding corporations were established in Kearny. Several streets were built in the district. Eventually, under the plan, 4000 acres of this part of the harbor were

to be filled in and improved, a number of water channels were to be dredged extending into all parts of the new land, piers were to be constructed at least 1200 feet long to accommodate ocean-going vessels, and equipped with adequate railroad tracks, electric traveling cranes, warehouses, etc. In 1922, the Central Railroad of New Jersey was authorized by the War Department to build a bridge across the lower end of Newark Bay to replace the trestle and drawbridge then standing. This permission the city contested in the courts Further appropriations of $2,100,000 for the immediate improvement of Newark Bay and the Passaic and Hackensack Rivers was authorized by Congress in 1922; in 1924, the government had started additional widening of Newark Bay channel and expected to spend nearly $800,000 in that year. Direct boat operation was established between Newark and Pensacola, Fla., Mobile, Ala., Beaumont and Port Arthur, Tex., Los Angeles and San Francisco, Cal., Portland, Ore., and Seattle, Wash. In 1923, new industrial establishments made investments in Newark of approximately $70,000,000. The commission form of government was adopted by the city in 1917.

NEWARK MUSIC FESTIVAL. See MUSIC, *Festivals.*

NEW BEDFORD. The fourth city in Massachusetts in population and third in value of its manufactured products The population increased from 96,652 in 1910 to 121,217 in 1920, nearly 40 per cent in 10 years, and to 130,072 by estimate of the Bureau of the Census for 1923. During the decade 1914–24 a State pier 750 feet long was completed. A modern intercepting sewer system was installed, adequate to care for a population of 300,000. The capital invested in the cotton mills, the leading industry, rose from $47,820,575 in 1914 to more than $175,000,000 in 1924, and the number of persons employed from 31,820 to 36,000 The public library was increased from 150,000 to 160,000 volumes.

NEWBERRY, TRUMAN HANDY (1864–). An American financier and public official, born in Detroit, Mich. He graduated from Yale in 1885 and was later connected in various capacities with railroads and other industrial organizations. In the Spanish-American War he served as lieutenant and navigator. He was appointed Assistant Secretary of the Navy in 1905 and served until 1908, when he assumed the post of Secretary of the Navy until March, 1909. In the War he was commander of the United States Naval Reserves. He was a candidate for the United States Senate in 1918 and in the primaries defeated Henry Ford for the nomination. He was later elected. The expenditure of over $200,000 in the primaries led to accusations of corruption. He was tried and convicted in the State courts, but the case was dismissed in the United States Supreme Court. Charges were brought before the Senate Committee on Privileges and Elections in 1922, and he was exonerated. He resigned his seat following the elections of 1922. See MICHIGAN.

NEW BRUNSWICK. A Canadian maritime province, with an area of 27,985 square miles. In 1911 the population was 351,889; in 1921, 387,876, a gain of 10.23 per cent. The rural population in 1921 was 67.9 per cent of the total; in 1911 it had been 71.7 per cent. Populations of the principal towns in 1921 were: St. John, 47,166 (42,511 in 1911); Moncton, 17,488; Fredericton, the capital, 8114.

Industry and Trade. In 1923 only 909,945 acres were under field crops out of the total area, although agriculture was the most important industry. The increase over 1914 was only slight (904,055 acres in 1914). Total value of yield in 1923, $20,864,300; in 1914, $20,045,100. Oats, hay and clover, and potatoes received the greatest attention. Dairying showed substantial gains, since 1,224,930 pounds of butter were made in 1922, against the 849,633 pounds in 1910. Fishing continued to occupy a high station; in 1922 the catch was valued at $4,688,276, comparing favorably with that of 1913. Mineral production in 1922, largely made up of coal and gypsum, reached $2,263,692, as compared with $1,102,613 in 1913. Much of the forest land was in the hands of the government, and lumbering ranked high among the industries. Lumber cut in 1921 was valued at $7,811,000; pulpwood made a very thriving industry (61,810 tons), worth about $5,244,000. Manufacturing progressed. In 1910 there were 1158 establishments (capital $36,125,012); in 1921, 1326 establishments (capital, $103,367,891). The output in 1910 was $35,422,302; in 1921, $59,514,741. Of the 50,406 horse power estimated available, 47,100 (1923) were already being worked. Exports, domestic and foreign, amounted to $75,924,379 in 1922–23 ($34,634,156 in 1912–13); imports in 1922–23, $27,574,668 ($14,445,811 in 1912–13). In 1922 there were 1947 miles of railway line as compared with 1545 in 1913.

Government. The receipts for 1922 were $3,226,728 ($1,459,000 in 1913), and expenditures $2,985,877 ($1,446,963 in 1913). The debt of the province in 1912 was only $4,693,457; by March, 1922, it had mounted to $25,463,932. The money expended on public works, i.e. hydro-electric development, roads, bridges, and grants to railways, accounted for the increase. By 1922 teachers had increased to 2246 from the 2002 in 1913, and pupils to 71,346 from the 63,580 in 1913. The total cost of education also increased, from $942,203 in 1913 to $2,657,046 in 1922. Of the three universities in the province, Mt. Allison, the largest, was in favor of a federation of the universities of all Maritime Provinces, but the University of New Brunswick stood in the way. The province was represented in the Canadian Parliament by 10 senators and 11 members of the house. The suffrage was exercised by both sexes.

NEW CALEDONIA. See PACIFIC OCEAN ISLANDS.

NEWELL, EDWARD THEODORE (1886–). An American numismatist, born at Kenosha, Wis., and educated at Yale University. From 1907 he was engaged in research in numismatics and kindred subjects. He was a member of numismatic and learned societies and wrote many works on coins and minting, including *The Dated Alexander Coinage of Sidon and Ake* (1916); *Tarsos under Alexander* (1919); *Myriandros* (1920); and *The Kyparissia Hoard* (1921). In 1917–18 he served with the military intelligence division of the United States Army.

NEWFOUNDLAND. A British dominion in North America, comprising the island of Newfoundland and Labrador (q.v.). The area of the island is 42,734 square miles; of Labrador,

120,000. The total population increased from 242,619 in 1911 (Labrador, 3949) to 262,979 in 1921 (Labrador, 3621). St. John's, the capital, had a population of 37,047 in 1921 (32,292 in 1911); Harbor Grace, 3825 (4279); Bonavista, 4025 (3911); Carbonear, 3320 (3540). The population, the great bulk of which was native and of English, Irish, and Scotch descent, still remained practically concentrated on the southeast coast. Emigration rose noticeably during the postwar depression.

Industry and Trade. Fishing continued to exceed all other occupations in importance. During the War it enjoyed exceptional prosperity in consequence of the general food shortage but afterward suffered an equally marked decline. For the falling-off in the cod fishery, a two-season attempt at government control of sales was held partly responsible. In 1922–23, 939 men and 51 vessels on the Banks brought in a catch of 69,372 quintals, compared with 152,374 quintals brought in by 1830 men in 104 vessels in 1913. The serious decline in the seal fishery was partly attributable to the loss of ships and the prohibitive cost of shipbuilding In 1913, 19 steamers with 3609 men brought in 272,065 seals; in 1922–23 it required a government subsidy and removal of all restrictions to induce 8 vessels with 1224 men to carry on the work, and only 101,770 seals were taken in that year. The lobster, herring, and whale fisheries also showed a distinctly downward trend; the lobster had grown scarce because of overfishing; the herring market was affected by renewed European competition; the whale fisheries had practically ceased The prime reason for this serious slump, however, was the depreciation of currencies in the Mediterranean countries which had grown to be the chief markets for the catch. At prevailing rates of exchange, that trade had ceased to be profitable To relieve the serious situation that ensued, the government in 1923 undertook a programme of encouragement for industry and farming, in order to relieve the almost entire economic dependence of the island on its fisheries. Plans were under way in that year to develop the water-power resources at Grand Lake on the west coast, at a cost of $18,000,000, part of which was to be advanced by the British government. This project was expected to supply power for a large pulp and paper mill, to hasten the development of mineral resources, and possibly to lead to the smelting of iron. Incidentally the preliminary work was reducing unemployment. The industries growing out of the great forest resources had already extended considerably. Spruce had replaced the disappearing pine as the important wood. Pulp and paper mills in 1920 exported 19,864 tons of pulp ($334,276) and 80,719 tons of paper ($4,725,660). The mineral production, chiefly iron, in 1912 amounted to $2,810,000; in 1920–21, 607,982 tons of iron, valued at $672,061, were exported. Some copper and oil had been produced. The mineral resources were as yet unexplored, although in 1921 a beginning was made at the development of certain coal deposits and the investigation of oil-bearing lands. Of the 4,000,000 acres capable of cultivation, up to 1923 only 220,000 were being utilized, and the government was actively encouraging the population away from the sea to the land. The chief crops were hay, potatoes, cabbage, turnips, and oats. The total value of farm crops in 1912 was $2,000,000; in 1921, $14,367,877. Exports, which in 1913–14 were valued at $14,720,000, had risen by 1918–19 to $36,784,616 but fell sharply in two years to $19,478,417 in 1921–22 ($20,956,863 in 1922–23). Imports fluctuated likewise: $14,793,000 in 1913–14; $40,533,388 in 1919–20; $18,309,853 in 1921–22; $19,321,824 in 1922–23. The export trade with Canada gained considerably in importance in 1922–23, but the chief markets were still the United Kingdom, Portugal, Spain, and the United States. The bulk of the imports came from Canada and the United States, the former achieving first place as a source during this period. Dry codfish remained the principal export, with manufactured paper in second place. Other important items in 1922–23 were iron ores, cod oil, herring, pulp and sulphide, lobsters, sealskins, and seal oil. The total value of fishery exports in that year was $12,374,109 ($14,448,736 in 1921–22). The total revenue of the dominion, in bulk from customs, was $3,142,491, and the expenditure $3,524,653, in 1911–12. From 1917 to 1921, there was a decided surplus in the treasury in spite of extraordinarily generous appropriations In 1921–22, however, the revenue had shrunk to $8,269,680, with an expenditure of $9,127,542, but from that year the situation began to mend. The increase of the funded public debt from $29,470,060 in 1912–13 to $55,030,027 in 1921–22 was largely due to war expenditure ($60 per capita). In 1922–23, the revenue was $8,876,772, expenditure, $9,552,301; funded debt, $54,957,765. In 1919 there were 904 miles of government railroad, as compared with 794 in 1913 Additional proposed extensions had been postponed during the War, after which, because of unprofitable operation, the management of the roads and their extension became a conspicuous problem of the government. There was an additional 47 miles of private line. The mileage of telegraph wires (open) increased from 4225 in 1914 to 4600 in 1922; telephone wires, from 899 in 1913 to 965 in 1922. Steamship communications with the United Kingdom, Canada, and the United States were disorganized during the War, but were being steadily restored. Public instruction still remained under denominational auspices, with government support, and school attendance had not been made compulsory by law.

History. A Newfoundland regiment was enlisted on the outbreak of the War, and saw service in Gallipoli, Egypt, France, and Flanders. In all, some 6500 men were under arms. In 1913, Sir Edward Morris's party was returned to office and continued in power through 1917, when the Morris government was succeeded by a ministry headed by Sir William Lloyd. In 1919, Sir Michael Cashin became premier; in November, 1919, as a result of the general election, Mr. Richard Squires succeeded to office. The Squires government, however, resigned in 1923, though the general election of May had returned it with a sizable majority. Mr. W. R. Warren was then summoned by the governor. On Dec. 26, 1923, Premier Warren brought a grave accusation against his predecessor, Sir Richard A. Squires, charging him, among other things, with the receipt of money from private corporations and diversion of government funds to individuals occupying high official posts. An investigator for the British Colonial Office found the

charges in a large measure true; this was followed by the arrest of Squires in April and the overthrow of the Warren government. Reorganization of the public services and a greater honesty in government became the leading issues of the day. Mr. Hickman, who succeeded Mr. Warren, enjoyed only a brief tenure of office, for his party was turned out in the general election of June 3. He was in turn followed by Mr. Walter Warren who proceeded to investigate his predecessor's government.

NEW GUINEA. One of the largest islands of the world, in the East India Archipelago. Area, 320,000 square miles (estimated). Politically it was divided into: (1) Dutch New Guinea, area, 160,692 square miles; population (1920) 195,460; (2) Territory of Papua (British New Guinea), area, 90,540 square miles; population 276,888 (1922); (3) Territory of New Guinea (late Kaiser Wilhelm's Land), area, 70,000 square miles; population (estimated), 100,000. This was for the mainland only.

Dutch New Guinea was administered from the Dutch East Indies (q.v.), of which, for trade and other purposes, it was considered an integral part.

The Territory of Papua was a possession of the Australian Commonwealth. Little of the area was under cultivation; the natives are averse to hard labor. In all, only 219,181 acres had been leased by planters (1922), and coconuts, rubber, and sisal hemp were the chief products. Gold continued to be mined to some extent, and boring for oil began after 1915. The gold output declined from £64,115 in 1912–13 to £60,091 in 1921–22 Imports and exports for 1913-14 were £212,134 and £123,140; for 1921, £484,770 and £172,672. Revenues and expenditures for 1913–14 were £54,703 and £81,095; in 1921–22, £73,288 and £124,912. To meet the deficit, Australia supplied an annual grant of £50,000. The Australian government showed itself zealous in the preservation of the integrity of the natives and refused to settle cheap coolie labor in the territory. In 1922 Europeans numbered 1104. Port Moresby was the chief town and port of call for Australian ships.

The Territory of New Guinea was the name given to the former German New Guinea and included besides the late Kaiser Wilhelm's Land (area 70,000 square miles; population, 100,000), the Bismarck Archipelago (area 17,600 square miles; population, 188,000), made up of New Britain, New Ireland, and other islands, and Bougainville and Buka of the Solomon Islands group (area 3400 square miles; population, 17,000). On Sept. 12, 1914, an Australian force occupied the islands. A mandate was given to Australia for the territory by the League of Nations on Dec. 17, 1920; the Australian government established its civil administration on May 9, 1921. The seat of government was at Rabaul on New Britain, the former German capital. In 1921, nonindigenous inhabitants numbered 3173, divided as follows: 715 British, 1402 Chinese, 215 Dutch, 579 Germans, 87 Japanese, and 60 Americans. On the mainland coconuts were cultivated as well as rubber and cocoa; tropical fruits served as the articles of food. Total revenues for 1918–19 and 1921–22 were £55,760 and £91,644. Exports for the same years were £269,666 and £499,197; imports, £271,861 and £468,711. Leading exports were copra, shell, cocoa, and birds of paradise. Imports included groceries, hardware, tobacco, spirits, and oils. See also ETHNOGRAPHY.

NEW HAMPSHIRE. New Hampshire is the forty-third State in size (9341 square miles), and the forty-first in population; capital, Concord. The population increased from 430,572 in 1910 to 443,083 in 1920, a gain of 2.9 per cent. The white population increased from 429,906 to 442,331; negro, from 564 to 621; native white, from 333,348 to 351,098. The number of foreign-born white fell from 96,558 to 91,233. The urban population of the State mounted from 255,099 to 279,761, while the rural decreased from 175,473 to 163,322. There are only two important cities, Manchester and Nashua. The former increased from 70,063 in 1910 to 78,384 in 1920; the latter from 26,005 to 28,379.

Agriculture. While the population of the State increased 2.9 per cent in the decade 1910–20, the number of farms decreased 24.1 per cent (from 27,053 to 20,523); the land area in farms, from 3,249,458 acres to 2,603,806, or 19.9 per cent; the improved land in farms, from 929,185 acres to 702,902. The total percentage of land used for agricultural purposes decreased from 56.2 in 1910 to 45 in 1920; the percentage of improved farm land, from 28.6 to 27. The total value of farm property showed an apparent increase from $103,704,196 to $118,656,115, or 14.4 per cent; the average value per farm, from $3833 to $5782, or 50.8 per cent. In interpreting these values and indeed all comparative values in the decade 1914–24, the inflation of the currency in the latter part of the period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 20,523 farms in 1920, 18,604 were operated by owners, 546 by managers, and 1373 by tenants. The comparative figures for 1910 were 24,493, 681, and 1879. White farmers numbered, in 1920, 20,509, of whom 17,890 were native and 2619 foreign-born. In 1910 the white farmers numbered 27,038 (native-born, 24,347; foreign-born, 2691). Farms free from mortgage in 1920 numbered 11,992, compared with 18,119 in 1910; those under mortgage numbered 5389, compared with 6234. The number of dairy cows increased from 101,278 in 1910 to 119,203 in 1920, indicating a decided trend toward the dairy industry. "Beef cows," however, decreased from 16,175 to 5055, and sheep decreased from 31,201 to 28,021. The estimated production of the principal farm crops in 1923 was as follows: corn, 978,000 bushels; oats, 598,000; potatoes, 1,735,000; hay, 494,000 tons; and apples, 191,000 bushels. Comparative figures for 1913 are: corn, 814,000 bushels; oats, 420,000, potatoes, 2,074,000; hay, 495,000 tons.

Manufactures. New Hampshire is an important industrial State in point of value of products. There were, in 1920, 8 cities of 10,000 inhabitants or more, the combined population of which formed 43.7 per cent of the total for the State; in 1919 they reported 63.3 per cent of the value of the State's manufactured products. There were in the State, in 1909, 1961 manufacturing establishments; in 1914, 1736, and in 1919, 1499. Persons engaged in manufacture numbered 84,191, 85,013, and 90,332; while the capital invested amounted to

$139,989,662, $156,748,853, and $329,166,870 in those years. The value of the products, in 1909, was $164,581,019; in 1914, $182,843,863; and in 1919, $407,204,934. The increase in value of products from 1914 to 1919 was in great measure due to changes in industrial conditions brought about by the War. The first industry in point of value of products is the manufacture of boots and shoes, amounting to $39,440,000 in 1909; $46,695,000 in 1914, and $92,259,000 in 1919 The second in this respect is the manufacture of cotton goods, which had a value of $33,602,000 in 1909; $35,793,000 in 1914; and $86,392,000 in 1919. Manufactures of woolen and worsted goods, in third place, were valued, in 1909, at $16,731,000; 1914, $15,039,000; and 1919, $45,944,000. The paper and wood pulp industry, next in order, had an output valued at $13,994,000 in 1919; $17,708,000 in 1914; and $41,826,000 in 1919 The most important manufacturing cities are Manchester and Nashua. In Manchester there were, in 1909, 175 manufacturing establishments, with a product valued at $46,812,000; 1914, 151 with $50,800,000; 1919, 165 with $117,493,000 Nashua had, in 1909, 104 manufacturing establishments, with a product valued at $17,326,000; in 1914, 87 with $22,780,000; and in 1919, 92 with $48,985,000. Other important manufacturing cities are Concord, Dover, Keene, Berlin, Laconia, and Portsmouth.

Education. The development of its educational system has always been one of the chief concerns of the people of New Hampshire. As in the case of the other New England States, the decrease in rural population has proved a difficult problem. In 1919 large sections of New Hampshire had become so impoverished and so depopulated that under the existing school laws reasonable elementary education could not possibly be provided for a very large number of children. Because of this, the Legislature, after a careful study, reorganized the school system and for the first time in the history of the State wrote the school laws into a consistent code, in 1921. The results of this action were immediate. The principles of Americanization, equalization, and supervision were adopted. More specifically, the Board of Education was reorganized, methods of consolidation were provided, and, especially, provision was made for education in sparsely populated districts. The Legislature of 1923 passed several important measures which amplified and revised measures already enacted For one, the provisions of the Smith-Hughes Act of 1917 for the promotion of vocational education were accepted, and the State Board of Education was authorized to arrange with institutions, and with the school boards of towns or city districts in the State, to furnish the necessary buildings and equipment for carrying out the provisions of the Federal Act In 1914 the enrollment in the public schools was 63,004; in 1922, 75,683. In the latter year, in the elementary schools, 58,475 were enrolled; in the kindergartens, 1825; and in the high schools, 10,322 The total expenditure for public education in 1923 was $5,718,609. The percentage of illiteracy in the State decreased from 5.5 in 1910 to 5.4 in 1920; among the native white population, from 0.9 to 0.6; among the negro, from 13.8 to 7.7. In the foreign-born population it increased from 15.4 to 16.4.

Finance. For finance, see STATE FINANCES.

Political and Other Events. In the decade 1914–24, New Hampshire remained consistently Republican, with the exception of one year, when the Democrats succeeded in electing their candidate for governor. In 1914 elections were held for governor, United States Senator, and Representative in Congress. Rollin H. Spalding was reëlected Governor, and J. H. Gallinger was reelected to the Senate. The Republicans elected two Representatives to Congress. In the elections of 1916 the Republicans elected their candidate for governor, Henry W. Keyes, and carried other State offices, although at a reduced margin In the presidential voting of this year, President Wilson obtained 43,871 votes, Charles E Hughes, 43,725. At this election the people voted to call a constitutional convention. In January, 1916, the United States government purchased, under the Weeks Forestry Land Act, a tract of 55,000 acres to be added to the forest reserves of the State. Senator Gallinger died during the primary election campaign of 1918, and the term of Henry F. Hollis, Democrat, expired in 1918. It was thus necessary to elect two Senators in this year. Gov. Henry W Keyes was elected for the regular term, and George H. Moses was chosen successor to Senator Gallinger. In the State election, John H. Bartlett, Republican, was elected governor, together with a Republican Legislature. The constitutional convention met in June, 1918, but adjourned following its organization. It met twice subsequently, but none of the amendments it submitted to the people was ratified. Elections were held in 1920 for United States Senator and for governor and other State officers. The Republicans elected their candidate for governor, Albert O Brown, and reelected Senator Moses to the Senate. In the presidential election of this year, W. G. Harding received 94,947 votes; James M. Cox, 62,562 In 1922 the Democrats succeeded to power in the State and elected their candidate for governor, Fred H. Brown, and a Representative to Congress. They also elected a majority of 10 in the Legislature, although the Republicans continued to control the Senate. F. H. Brown was inaugurated in January, 1923. In his inaugural message he favored a law establishing a 48-hour week for women and children in the manufacturing industries, an amendment of the tax laws, and a tax of $.01 a gallon on gasoline.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. The Legislature of 1917 amended the laws relating to the conduct of trials and made provision for the calling of a constitutional convention in June, 1918. The governor was given authority to suspend the labor laws by the request of the Council of National Defense. A "blue sky" law was enacted, and the laws relating to banking and education were amended. The Legislature of 1919 ratified the Federal prohibition amendment on January 16 of that year and the woman suffrage amendment on September 9. The Legislature of 1921 regulated the practice of chiropractors; provided further safeguards against forest fires; made provisions for the protection of maternity and infancy; and regulated and limited the investments of savings banks. In 1923 the Legislature made provision for another constitutional convention; passed a uniform sales act, lev-

ied a gasoline tax, and laid a tax on income from intangibles

NEW HAMPSHIRE, UNIVERSITY OF. A coeducational State institution at Durham, N. H., founded as the New Hampshire College of Agriculture and the Mechanic Arts in 1866 and incorporated as the University of New Hampshire, July 1, 1923 The university more than tripled in size during the decade between 1913–14 and 1923–24, with 300 students enrolled and 46 members of the faculty in the former year as compared with 1123 students and 99 members of the faculty in the latter The library was increased from 35,000 to 47,800 volumes. Two men's dormitories, a women's dormitory, and a commons building were added to the physical plant. Ralph Dorn Hetzel, A.B., LL.B., LL.D., succeeded Edward Thomson Fairchild, A.M., LL.D, as president in 1917.

NEW HAVEN. The largest city of Connecticut and the fourth largest city of New England; a manufacturing and educational centre. The population rose from 133,605 in 1910 to 162,537 in 1920 and to 172,967 by estimate of the Bureau of the Census for 1923 A new railroad station was built, as well as a number of new buildings at Yale University, and a commercial high school and two junior high schools; and there was a wide extension of manufacturing and office facilities. More than 500 acres were added to the city park system, including shore frontage for a municipal bath beach

NEW HEBRIDES. See PACIFIC OCEAN ISLANDS.

NEW JERSEY. New Jersey is the forty-fifth State in size (8224 square miles), and the tenth in population; capital, Trenton. The population increased from 2,537,167 in 1910 to 3,155,900 in 1920, a gain of 24.4 per cent. The white population increased from 2,445,894 to 3,037,087; Negro, from 89,760 to 117,132; native white, from 1,787,706 to 2,298,474; and foreign-born white, from 658,188 to 738,613. Both urban and rural populations increased during the decade; the former from 1,907,210 to 2,474,936; the latter, from 629,957 to 680,964 The growth of the principal cities was as follows Newark (q.v.), 347,469 (1910), to 414,524 (1920); Jersey City (q.v.), 267,779 to 298,103; Paterson (q.v.), 125,600 to 135,875; Trenton (q.v.), 96,815 to 119,289, Camden (q.v.), 94,538 to 116,309.

Agriculture. In common with most of the eastern States, the development of agriculture in the decade 1910–20 did not keep pace with the growth in population. This is shown by the fact that while the population increased during the decade 24.4 per cent, the number of farms decreased 11.3 per cent (from 33,487 in 1910 to 29,702 in 1920); the rural population decreased from 29.4 per cent in 1900 to 24.8 per cent in 1910 and 21.3 per cent in 1920. The acreage of land in farms decreased 11.3 per cent, or from 2,573,857 acres to 2,282,585; while the improved land in farms showed an even greater decrease, from 1,803,336 to 1,555,607 acres, or 13.7 per cent The percentage of the total land area in farms decreased from 53.5 per cent in 1910 to 47.5 per cent in 1920, while the percentage of improved land in farms decreased from 37.5 to 32.3. The total value of farm property in the State showed an apparent increase of 22.4 per cent, or from $254,832,665 to $311,847,948; the average value per farm, from $7610 to $10,499. In interpreting these values, however, and, indeed, all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the 29,702 farms in 1920, 21,889 were operated by owners, 987 by managers and 6826 by tenants. The corresponding figures for 1910 were 24,133, 1060 and 8294. White farmers in 1920 numbered 29,167 and colored farmers, 535. In 1910, the white farmers numbered 33,011 and colored farmers, 476. Farms free from mortgage in 1920 were 10,000; those under mortgage, 10,085. In 1910, the unmortgaged farms numbered 11,983; those under mortgage, 11,793. The total number of cattle in 1920 was 179,459, in 1910, 222,999. Dairy cattle numbered 172,693 and 154,418, in those years. Sheep in 1920 numbered 10,471, compared with 30,683 in 1910; hogs, 139,222 as compared with 147,005 The estimated production of the chief farm products in 1923 was as follows: corn, 9,416,000 bushels; wheat, 1,480,000 bushels; oats, 1,588,000 bushels; rye, 1,157,000 bushels; potatoes, 6,360,000 bushels; sweet potatoes, 2,323,000 bushels, hay, 313,000 tons; and peaches, 2,380,000 bushels. Comparative figures for 1913 are: corn, 10,862,000 bushels; wheat, 1,408,000; oats, 2,030,000; rye, 1,260,000; potatoes, 8,930,000; and hay, 469,000 tons.

Mining. New Jersey is one of the most important mineral-producing States in the eastern part of the country, and it is the only far eastern State that produces zinc. Although it has a considerable diversity of mineral products, the most important are clay products and zinc. The values of the clay products have been $16,484,652 (1914); $20,814,402 (1916); $20,741,244 (1918); $40,021,028 (1920); $27,214,685 (1921). Zinc production was 74,253 short tons (1914); 112,020 short tons (1916); 98,470 (1918); 77,371 (1920); 56,447 (1921) Cement is also one of the most important mineral products, shipments were 3,530,476 barrels valued at $3,081,205 (1914); 2,397,069 barrels, $2,962,592 (1917); 2,563,453, $5,096,558 (1920); 2,840,699, $4,820,538 (1921) In addition to the minerals mentioned, the State produces a small quantity of iron ore and large quantities of sand, gravel and stone. The total value of the minerals in 1921 was $47,429,290, compared with $72,335,207 in 1920; $56,898,033 in 1919; $49,510,290 in 1918; and $31,756,503 in 1914.

Manufactures. New Jersey is one of the leading industrial States. In 1920, there were 39 cities having a population of more than 10,000. These contained 65.6 per cent of the total population of the State, and in 1919 reported 76.4 per cent of the State's manufactured products There were in the State 8817 manufacturing establishments in 1909; 9742 in 1914; and 11,057 in 1919. Persons engaged in manufacture numbered 371,265, 431,003, and 602,170; and the capital invested amounted to $977,172,141, $1,352,381,873, and $2,815,577,127, in those years The total value of the products was $1,145,529,076 in 1909; $1,406,633,414 in 1914; and $3,672,064,987 in 1919. The large increase in value of products during 1914–19 was due largely to the change in in-

dustrial conditions brought about by the War, and cannot be properly used to measure the growth of manufactures during the period; but the increase in number of wage earners and in number of establishments indicates clearly a decided growth in the manufacturing activities of the State. The most important industry in point of value of product is the refining of petroleum, valued in 1914 at $90,877,000; and in 1919, at $280,995,000. The smelting and refining of copper ranks second in this respect: in 1909, $125,651,000; in 1914, $159,199,000; and in 1919, $244,269,000. Shipbuilding, in third place, had a product valued at $8,841,000 in 1909; $11,861,000 in 1914; and $238,015,000 in 1919; the extraordinary increase from 1914 to 1919 being due to the conditions resulting from the War. The three-year period from 1916 to 1919 shows an abnormal increase in vessels and gross tonnage launched, which renders comparison of little value. Silk goods, next in order, were valued in 1909 at $65,540,000; in 1914, $75,706,000, and in 1919, $215,051,000. The most important manufacturing cities are Newark, Jersey City, Paterson and Trenton. In Newark there were 1857 manufacturing establishments in 1909, with a product valued at $201,888,000; 2275 in 1914, with $210,601,000; and 2155 in 1919, with $577,609,000. In Paterson, there were 702 in 1909, with $69,263,000; 735 in 1914, with $78,429,000; 1044 in 1919, with $216,659,000. Jersey City had 745 manufacturing establishments in 1909, with a product valued at $128,775,000; 770 in 1914, with $164,529,000; 896 in 1919, with $374,183,000. Similar figures for Trenton were 340 manufacturing establishments, with a product valued at $49,115,000; 304 with $54,822,000; 389 with $122,478,000. Other important manufacturing cities are Camden, Bayonne, Hoboken and Passaic.

Education. In the decade 1914–24, important progress was made in educational matters in New Jersey. Much important legislation was passed, especially in the latter part of the period. In 1919, there was established by law a new teachers' pension annuity system to supersede the old teachers' retirement fund. The new system operates on an actuarial basis: contributions from salaries of teachers are matched by the State, and this provides a pension of approximately half pay. A compulsory physical education law also was passed in 1919; and a continuation school law, requiring children from 14 to 16 years of age to attend continuation classes six hours a week after working papers have been obtained. In 1922, provision was made for special aid by the State to school districts not able of themselves to provide satisfactory schools. The complete survey of finances and business procedure of school districts made in 1921–22 resulted in improved methods in the handling of public moneys. A new normal school was opened at Glassborough in 1923, and in the same year plans were started for a new normal school in Jersey City. Between 1913 and 1923, the enrollment in the public schools increased from 501,948 to 646,046, and the number of teachers increased from 14,811 to 18,273. In the same period the cost of education more than doubled, the cost per pupil, based on average daily attendance, being $91.77 in 1923 as contrasted with $43.72 in 1913. The chief item in this greatly increased cost was the much higher salaries for teachers. The percentage of illiteracy in the State decreased from 6.7 in 1910 to 6.6 in 1920: among the native white population, from 1.4 to 0.9 per cent; among the Negro, from 11.9 to 7.5. The foreign-born white population increased from 14.8 to 16.3 per cent

Finance. For finances, see STATE FINANCES.

Political and Other Events. The control in New Jersey in the decade 1914–24 was divided between the Republican and Democratic parties, with the preponderance of power with the former. In 1914 the Republicans elected a majority in both branches of the Legislature for the first time since 1911. They also elected eight Representatives in Congress, and the Democrats, four. In 1915, at a special election on October 19, an amendment extending the suffrage to women was defeated. In elections held in November of this year, for members of the State Senate and the House, the Republicans increased their majorities in both branches of the Legislature. In 1916 elections were held for governor and for United States Senator. Walter E. Edge, Republican, was elected governor, and Joseph S. Frelinghuysen was elected to the Senate In the presidential voting of this year, Charles E. Hughes received 268,982 votes; President Wilson, 211,018. The voters of Newark, on Aug. 9, 1917, adopted a commission form of government. In 1919 the Democrats elected their candidate for governor, Edward I. Edwards, but the Republicans held the Legislature. In 1920 the presidential voting gave Warren G. Harding 611,541 votes; James M. Cox, 256,887. In 1922 the Democrats were successful in electing George S. Silzer, governor; E. I. Edwards, United States Senator; and six Representatives in Congress. The Republicans held both houses of the Legislature. The chief issue of the campaign was prohibition. The Democratic candidates for governor and Senator openly opposed the State prohibition enforcement act and the Volstead Act. On Feb. 2, 1922, the State court of Errors and Appeals held the State prohibition enforcement law constitutional but "unworkable," and a new act was passed by the Republican Legislature. Governor Silzer, elected in 1922, was inaugurated governor on Jan. 16, 1923. A contest lasting eight weeks between the Governor and the Legislature over the appointment of a new highway commission ended with the confirmation of the Governor's nominations. The commission is headed by Gen. Hugh L. Scott.

Legislation. The Legislature in New Jersey meets annually. The most important acts in the decade 1914–24 are noted below. In 1914 the Legislature passed a home rule act affording cities under a commission form of government greater latitude in the administration of local affairs. In 1914 the Legislature passed a concurrent resolution extending the suffrage to women. As the amendment resolution had already passed the preceding Legislature, it was submitted to the people, as noted above, on October 19, and was defeated. The Legislature of 1917 amended the health laws of the State in important details. In 1918 the Legislature passed a local option bill and a supplement to the corrupt practices act and amended the child labor and other laws. A workmen's compensation bureau was created, as well as a department of charities and corrections with supervisory capacity over certain State institutions.

The Legislature also created an Inter-State Bridge and Tunnel Commission, a Board of Fisheries and a Boxing Commission. Several measures relating to the war emergency were passed at this session. In 1919 the laws relating to the State charitable, penal, and reformatory institutions were revised. Provision was made for the appointment of a commission to investigate the tax laws. This Legislature also passed a measure permitting a jury, as a part of its verdict, to recommend life imprisonment, in which case the death penalty shall not be imposed. The Legislature also enacted a child labor law and passed measures forbidding the display of the red flag or any other symbol or emblem calculated to excite hostility or violence against the government The Legislature rejected the Federal prohibition amendment on Mar 18, 1919. In 1920 the Legislature passed a measure permitting the manufacture and sale in the State of liquor containing 3 5 per cent alcohol. Provision was made for a retirement pension for police and firemen. A bond issue of $28,000,000 for the share of New Jersey in the Delaware Bridge between Camden and Philadelphia, and the Hudson River vehicular tunnel between Jersey City and New York, was authorized In 1921 the Assembly ratified the prohibition amendment, but it was defeated by the Senate The 3 5 per cent alcohol act was repealed. The Legislature created in 1921 a Department of State Police This bill was vetoed by Governor Edwards, but was passed over his veto. In 1922 the Legislature passed measures appropriating $100,000 for the development of the port of New York, under a joint board of members from New York and New Jersey The Legislature on Mar. 9, 1922, finally ratified the Eighteenth Amendment and passed laws for prohibition enforcement over the Governor's veto It also authorized a bond issue of $40,000,000 for the construction of good roads. In 1923 the Legislature passed a measure extending the payment of a soldiers' bonus to 1924, prohibited night work for women in factories after Dec 31, 1924, authorized cities to adopt the city-manager form of government, and passed an act to prevent mob violence.

NEW JERUSALEM, CHURCH OF THE. This organization, commonly known as the New Church, which considers itself the organ of a new spiritual dispensation and not a denomination of the historic Christian church, teaches that the true doctrines of Christianity and the spiritual meaning of the Scriptures were revealed in the writings of Emanuel Swedenborg The first society was established in 1787 in London and the first local organization in the United States in 1792. The General Convention of the New Jerusalem in the United States of America was founded in 1817. Owing to the adoption of a stricter method of counting, involving also the omission of Canadian members, the General Convention declined in number of societies from 96 in 1914 to 86 in 1924 and in membership from 6423 to 5959. Home missionary work was carried on during this period in the United States and Canada, and foreign missions in Denmark, France, Germany, Switzerland, Latvia, Czecho-Slovakia, Austria, Sweden, Japan, and British Guiana; and by the General Church and the British Conference also in South Africa and India. A missionary was sent to the Philippines in 1921, and the first church established there. In the same year the federation of French-speaking New Church people was formed, and in August, 1924, a federation of German-speaking New Church people was organized. The various branches of the New Church, both British and American, in 1922 brought to completion the photofacsimile reproduction of Swedenborg's theological manuscripts (18 thick folio volumes, supplementing 10 others previously published) and the 100 sets were apportioned to church depositaries and large public and university libraries.

NEWMAN, HORATIO HACKETT (1875–). An American zoölogist, born near Seale, Ala., and educated at McMaster University and the University of Chicago. He was instructor in zoölogy at the University of Michigan (1905–08); professor at the University of Texas (1908–11), and associate professor (1911–17), professor (1917–), and dean of the colleges of science (1915–), at the University of Chicago He published *The Biology of Twins* (1917), *Vertebrate Zoölogy* (1919), and *Readings in Evolution, Genetics and Heredity* (1921).

NEW MEXICO. New Mexico is the fourth State in size (122,634 square miles), and the forty-third in population; capital, Santa Fé. The population increased from 327,301 in 1910 to 360,350 in 1920, a gain of 10.1 per cent. The white population increased from 304,594 to 334,673. Negro, from 1628 to 5733; native white, from 281,940 to 305,596, and the foreign-born white, from 22,654 to 29,077 The number of Indians in 1920 was 19,512, compared with 20,573 in 1910. The urban population of the State rose during the decade from 46,571 to 64,960, the rural, from 280,730 to 295,390. The only large city in the State is Albuquerque, which increased from 11,020 in 1910 to 15,157 in 1920.

Agriculture. While the population of the State increased 10.1 per cent in the decade 1910–20, the number of farms decreased 16 3 per cent (from 35,676 to 29,844). The acreage in farms, however, showed a decided increase from 11,270,021 to 24,409,638, or 116 6 per cent; and the acreage of improved land in farms increased from 1,467,191 to 1,717,224. The total percentage of the total area used for agricultural purposes increased from 14 4 in 1910 to 31.1 in 1920; but the percentage of farm land improved decreased from 13 to 7 per cent The total value of farm property showed an apparent increase from $159,447,990 up to $325,185,599, or 103 9 per cent, the average value per farm from $4469 to $10,896 In interpreting these values, and, indeed, all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 210 in 1920. Of the 29,844 farms in 1920, 25,756 were operated by owners, 433 by managers, and 3655 by tenants The comparative figures for 1920 were 33,398, 321, and 1957 White farmers in 1920 numbered 27,969, of whom 26,593 were native Of the 1875 colored farmers, 1833 were Indians. White farmers in 1910 numbered 33,528; native white farmers, 32,088; and colored farmers, 2148. Farms free from mortgage in 1920 numbered 16,650, compared with 31,382 in 1910; those under mortgage numbered 6257, compared with 1775. The number of dairy cows decreased

from 51,451 in 1910 to 45,827 in 1920; "beef cows" increased from 579,601 to 797,077; both increase and decrease being due partly to change in classification employed in these years. Sheep decreased from 2,894,984 in 1910 to 1,640,475 in 1920; hogs increased from 45,409 to 87,906. The area under irrigation increased from 461,718 acres in 1909 to 538,377 acres in 1919. The estimated production of the principal farm crops in 1923 was as follows: corn, 3,429,000 bushels; spring wheat, 1,323,000 bushels; winter wheat, 446,000 bushels; oats, 1,735,000 bushels; barley, 258,000 bushels; potatoes, 336,000 bushels, and hay, 358,000 tons Comparative figures for 1913 are: corn, 1,572,000 bushels; wheat, 1,221,000; oats, 1,500,000; barley, 96,000; potatoes, 612,000; and hay, 399,000 tons.

Mining. New Mexico is rich in mineral resources which have not yet been fully developed, principal among them, in order of importance, being coal, copper, silver and clay products. The progress of the mineral industry during the decade 1914–24 is indicated by a comparison of production figures for the principal minerals The coal production was 3,877,689 net tons, valued at $6,230,871 in 1914; 3,817,940 tons, $5,481,361 (1915), 3,793,011, $5,580,369 (1916); 4,000,527, $7,455,166 (1917), 4,023,239, $10,787,082 (1918), 3,683,440, $13,568,000 (1920), 2,453,482, $9,585,000 (1921). The increased value in 1920 and 1921 was due chiefly to the inflation of the currency and a corresponding decline in the purchasing power of money. The output of gold, copper, silver, lead and zinc for several years during the decade was as shown in the table The decrease in production in 1921 was due largely to the depression in business conditions which affected metal mining. In addition to the minerals mentioned, the State produces iron ore, sand and gravel, and stone. The total value of the mineral production in 1921 was $13,227,268, compared with $27,883,565 in 1920, $22,679,960 in 1919, $40,631,024 in 1918, and $18,072,919 in 1914

OUTPUT OF MINERALS IN NEW MEXICO

Year	Copper Pounds	Gold Dollars	Silver Fine ounces	Lead Pounds	Zinc Pounds
1914	59,307,925	$1,171,696	1,777,445	1,763,641	18,403,392
1916	92,747,289	1,382,480	1,766,274	8,214,189	36,570 649
1918	98,264,563	682,791	782,421	8,398,239	24,050,324
1920	54,400,691	480,302	768,042	2,869,525	10,013 580
1921	14 267 338	196 822	571,899	678,601	228,000
1922	31 937 207	412,693	752,240	3,012,223	4,496,806

Manufactures. See UNITED STATES, *Manufactures.*

Education. There was steady development in education in New Mexico during the decade 1914–24. The elementary schools undertook to furnish education not only in the essential branches, but also in vocational training, including agriculture, domestic science, and manual training The secondary schools during the 10 years of Statehood showed a remarkable increase in their development, the number having practically doubled and the ratio of attendance grown proportionately. In addition to these educational activities, the State provided for the education of the blind and the deaf and dumb. The county unit for administration purposes was developed in 1913 and supplemented by the county unit law of 1915 for purposes of taxation In 1921, the Legislature made provision for an educational auditor, whose duty it was to assist the various agencies throughout the State in the preparation of their financial budgets. The State, in 1917, took advantage of the Federal act which furnished aid to the States for the development of vocational education, under the provisions of the State law, the Board of Education being also the Vocational Board of Education; and vocational education was provided in both day and night schools. Vocational rehabilitation was also established with very satisfactory results The total enrollment in the State in 1914 was 67,147. This had increased, in 1922, to 76,670 (50,093 in county rural schools, 10,845 in city schools, and 15,732 in town schools). The ordinary expenditure for all schools was $4,362,756, in addition to which there were special levies amounting to over $2,000,000 The percentage of illiteracy in the State decreased from 23 4 in 1910 to 18 9 in 1920: among the native white population, from 18 8 to 15 2; among the foreign-born, from 31.2 to 28.6; among the Negro, from 15.9 to 4.4.

Finance. For finance, see STATE FINANCES.

Political and Other Events. An election was held in 1914 for Representatives in Congress and for certain State officials. At this election three amendments to the State constitution were voted on and carried. One of these provided that State and county officials may succeed themselves. Another reduced the term of State and county officials from four to two years, and a third repealed the clause on taxation in the constitution and eliminated the State Board of Equalization In elections the Republicans were generally successful. In 1916 the Democrats carried the State, electing A. A. Jones as United States Senator In the voting for president this year, President Wilson received 33,527 votes; Charles E Hughes, 31,152. The Democratic candidate for governor, E. C. De Baca, was elected, together with nearly half the other State officers In 1918 the Republicans again returned to power and elected their candidate for governor, O. A. Larrozolo. Albert B. Fall, Republican, was elected United States Senator. In 1920 elections were held for governor and other State officers. Merritt C. Mechem, Republican candidate, was elected governor. In the presidential voting of this year, W. G. Harding received 57,634 votes; J. M. Cox, 46,668. Senator Fall resigned in 1921 to become Secretary of the Interior in the cabinet of President Harding. At elections held to fill the vacancy caused by his appointment, Holm O. Bursum, Republican, was elected. The Democrats regained power in 1923, electing their candidate for governor, James F. Hinkle, and reëlected Senator Jones for the Senate. Governor Hinkle was inaugurated in January, 1923 In his inaugural address he condemned the State policy of road construction, urged the abolition of county boards of education, and proposed a State-wide primary law.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. In the Legislature of 1915, a workmen's compensation law was passed by the House but was defeated in the Senate. The Legislature of 1917 enacted a workmen's compensation law and amended the statutes relating to the administration of justice. In 1919, the Legislature amended the tax laws and created a State Board of Dental Examiners and a Girls' Welfare Board. It also provided for the recodification of the general banking law and authorized the commission form of government in cities of 10,000 or more population. In 1921, the Legislature made additional provisions for the protection of game, regulated the hours of labor for children, regulated the practice of chiropractic, created the office of county flood commissioner, and provided for emergency flood districts and their administration. It also prohibited gambling in the State, provided for a succession tax, created a Department of Public Welfare, and regulated and limited the working hours of women. The Legislature of 1923 proposed an amendment to increase the term of State officers in the State executive department and county officers from two to four years, passed a measure making it a felony to sell or give liquor to minors, and passed bills to facilitate cooperative marketing of agricultural products; provisions were made for creating associations for this purpose.

NEW ORLEANS. The largest city of Louisiana, and a port of entry. The population rose from 339,075 in 1910 to 387,219 in 1920 and to 410,000 by estimate of the Bureau of the Census for 1924. The most extensive work carried on by the city during the decade 1914–24 was the improvement of the port and the inner harbor by the construction of the Industrial Canal joining the Mississippi River and Lake Pontchartrain, an arm of the Gulf of Mexico The completion of this undertaking gave a new harbor of quiet water which varied 16 inches between high and low water as compared with the 19 feet variation of the river level, and also shortened the distance to deep water. The canal was 5⅓ miles long and 30 feet deep at low water, and was equipped with a concrete and steel lock 1020 by 150 feet and 68 feet from top to bottom. This was completed in 1923 and cost about $20.000,000. The east bank of the river was built up a considerable height by pumping mud from the river bottom by pipe-line dredge. Four concrete fireproof cotton warehouses and a large grain elevator were built on this land. Active city planning was started in 1920.

The successful campaigns which have been waged in New Orleans since the beginning of this century against disease and the conditions responsible for epidemics in the past has attracted the attention of medical men all over the world. Yellow fever, malaria, typhoid, and bubonic plague have all practically been eliminated from the health records of the city through the destruction of cisterns, the installation of a model water purification plant, the ratproofing of public buildings and docks, and the installation of an elaborate drainage system.

The value of building permits issued by the city increased from $1,790,514 in 1918 to $13,099,015 in 1923 and the property valuation from $443,157,725 to $521,956,873. Post office receipts rose from $1,269,874 in 1914 to $2,466,316 in 1923, and bank resources from $245,563,932 in 1921 to $297,017,705 in 1923. Exports in foreign commerce rose from 3,580,737 short tons in 1914 to 5,094,276 in 1922, and imports from 1,472,323 short tons to 5,119,663; coastwise shipping increased from 361,198 tons received and 603,863 tons shipped in 1914 to 957,623 tons received and 1,692,437 tons shipped in 1922. The number of persons engaged in manufacturing rose from 17,186 receiving $8,020,000 in wages and making products worth $78,794,000 in 1910 to 26,641 persons receiving $24,614,000 in wages and making products worth $182,799,000 in 1920. The number of public schools increased from 88 with an enrollment of 51,595 in 1920 to 108 with enrollment of 62,307 in 1924 In the years 1915–24, 60 miles of streets were newly paved, 54 miles of sewers laid, the fire department was motorized and 165 men were added to the personnel. See CITY PLANNING.

NEW SOUTH WALES. A constituent state of the Commonwealth of Australia in the southeastern part of the continent. Area, 310,372 square miles; population in 1911, 1,650,470; in 1921, 2,100,371, average annual increase, 2.4 per cent Sydney, the capital and largest city, with suburbs, had 955,900 inhabitants in 1922 (629,503 in 1911). Area under crops in 1912–13, 3,737,105 acres; in 1921–22, 4,445,828. Principal crops were wheat, maize, barley, oats, potatoes, and hay. Cane sugar, grapes, and citrus fruits were receiving increasing attention Grazing was of course a leading activity. Wool production in 1921–22 was 285,418,000 pounds, a falling off from the 326,804,000 pounds of 1912–13. Mining in 1921 yielded (1912 figure in parentheses): gold, £271,302 (£702,129); lead, silver, and silver-lead ore, £864,502 (£3,481,266); tin and tin ore, £163,451 (£338,074); copper, £41,267 (£579,791); zinc, £283,455 (£1,766,242); coal, £9,078,388 (£3,660,015); iron, £639,376 (£130,708). Manufacturing pursuits engaged 148,876 employees in 1921–22 (115,561 in 1912). Metal works and machinery, and plants concerned with food industries, were the most important. In 1921, the value of production of the various industries was: pastoral, £20,057,000; agricultural, £32,373,000; dairying, £16,447,000; forests and fisheries, £4,089,000; mining, £13,096,000; manufacturing, £42,192,000; total, £128,254,000. Imports overseas for 1913 and 1922 were £32,350,600 and £43,321,500; exports for the same years, £32,839,800 and £47,757,400. Leading exports were minerals, wool, dairy products, and meats. In 1922, 5116 miles of railway were open; in 1913, the number had been 4197 The operations of the government showed great increases in the period 1914–22. Total revenues for 1913–14 and 1921–22 were £18,438,228 and £35,637,820. Expenditures for the same years were £18,065,189 and £36,966,525. The public debt on June 30, 1913, was £100,170,747; by 1923 it had increased to £187,879,492. The Labor party gained its first impetus in New South Wales and continued to control the government more or less regularly.

NEW YORK. New York is the twenty-ninth State in size (49,204 square miles), and the first in population; capital, Albany. The population increased from 9,113,614 in 1910 to 10,385,227 in 1920; a gain of 14 per cent. The white population increased from 8,966,845 to 10,172,027; Negro, from 134,191 to 198,483; na-

tive white, from 6,237,573 to 7,385,915; and foreign-born white, from 2,729,272 to 2,786,112. The urban population of the State rose from 7,185,494 to 8,589,844, while the rural decreased from 1,907,210 to 1,795,383. The growth of the principal cities was as follows: New York (1910), 4,766,883 to (1920) 5,620,048; Buffalo, 423,715 to 506,775; Rochester, 218,149 to 295,750; Syracuse, 137,249 to 171,717; Albany, 100,253 to 113,344 (see articles on these cities).

Agriculture. New York, in common with nearly all the eastern States, showed a decline in agriculture, as compared with growth of population, in the decade 1910–20. While the population of the State increased 14 per cent, 1910–20, the rural population decreased from 27.1 per cent in 1900 to 21.2 per cent in 1910 and 17.3 per cent in 1920. The number of farms decreased 10.4 per cent (from 215,597 in 1910 to 193,195 in 1920); total acreage in farms, from 22,032,367 to 20,632,803, or 6.3 per cent, and the improved land in farms decreased from 14,844,039 to 13,158,781 acres, or 11.4 per cent. The total value of farm property in the State showed an apparent increase of 31.5 per cent, or from $1,451,481,495 in 1910 to $1,908,483,201 in 1920; the average value per farm, from $6732 to $9879. In interpreting these values, and, indeed, all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 193,195 farms in 1920, 151,717 were operated by owners, 4376 by managers, and 37,102 by tenants. The corresponding figures for 1910 were 166,674, 4051, and 44,872. White farmers in 1920 numbered 192,645, and colored farmers, 550. In 1910 the white farmers numbered 214,658 and the colored farmers, 939. The total number of cattle in 1920 was 2,144,244; in 1910, 2,423,003. The increase in number of dairy cattle, from 1,509,594 to 2,081,074, reflects the large growth of the dairy industry. The State had risen to second place in milk production, being exceeded only by Wisconsin. Sheep, in 1920, numbered 578,726, as compared with 930,300 in 1910; hogs, 600,560 as compared with 666,179. The estimated production of the principal crops in 1923 was as follows. corn, 24,408,000 bushels; spring wheat, 311,000 bushels; winter wheat, 7,895,000 bushels; oats, 32,552,000 bushels; rye, 945,000 bushels; barley, 5,168,000 bushels; potatoes, 29,813,000 bushels; tobacco, 2,272,000 pounds; buckwheat, 3,596,000 bushels; hay, 6,343,000 tons; and apples, 26,961,000 bushels. Comparative figures for 1913 are: corn, 15,020,000 bushels; wheat, 6,800,000; oats, 42,712,000; rye, 2,228,000; barley, 2,056,000; potatoes, 26,640,000; hay, 5,358,000 tons; and tobacco, 4,386,000 pounds.

Manufactures. New York is the most important of the manufacturing States, both in point of number of establishments and in value of product. In 1920, there were 58 cities with more than 10,000 inhabitants. These formed 78 per cent of the total population of the State, and in 1919 reported 87.5 per cent of the State's manufactured products. There were in the State 44,935 manufacturing establishments in 1909; 48,203 in 1914; and 49,330 in 1919. Persons engaged in manufacture numbered 1,203,241, 1,289,098, and 1,524,761; and capital invested amounted to $2,779,496,814, $3,334,277,526, and $6,012,082,567 in those years. The value of products amounted to $3,369,490,192 in 1909; $3,814,661,114 in 1914; and $8,867,004,906 in 1919. The large increase in value of products from 1914 to 1919 was due largely to changes in industrial conditions brought about by the War, and cannot be properly used to measure the growth of manufactures during the period; but the increase shown in number of wage earners clearly indicates decided growth in the manufacturing activities of the State. The most important industry in the State is the manufacture of women's clothing, the product of this industry being valued, in 1909, at $272,518,000; in 1914, at $345,316,000; and in 1919, at $886,984,000. The manufacture of men's clothing ranks second in point of value: in 1909, $266,075,000; in 1914, $238,627,000; and in 1919, $641,906,000. The refining of sugar, ranking third in this respect, was valued in 1914 at $124,941,000, and in 1919, at $268,318,000. Slaughtering and meat packing, in fourth place, had a product valued, in 1909, at $127,130,000; in 1914, at $148,106,000, and in 1919, at $265,726,000 The printing and publishing industry was next in value of product: in 1909, $216,946,000 1914, $257,268,000; and 1919, $478,898,000 The most important manufacturing cities are New York, Buffalo, and Rochester. In New York, there were 25,933 manufacturing establishments in 1909, with a product valued at $2,027,425,000; 29,621 in 1914, with $2,292,832,000; and 32,590 in 1919, with $5,260,708,000 Buffalo had 1753 establishments in 1909, with a product valued at $218,804,000; 2225 in 1914, with $247,516,000; and 2093 in 1919, with $634,410,000. Similar figures for Rochester were: 1203 in 1909, with $112,676,000; 1244 in 1914, with $140,697,000; and 1367 in 1919, with $351,416,000. The other important manufacturing cities are Albany, Binghamton, Niagara Falls, Schenectady, Syracuse, Troy, Utica, and Yonkers.

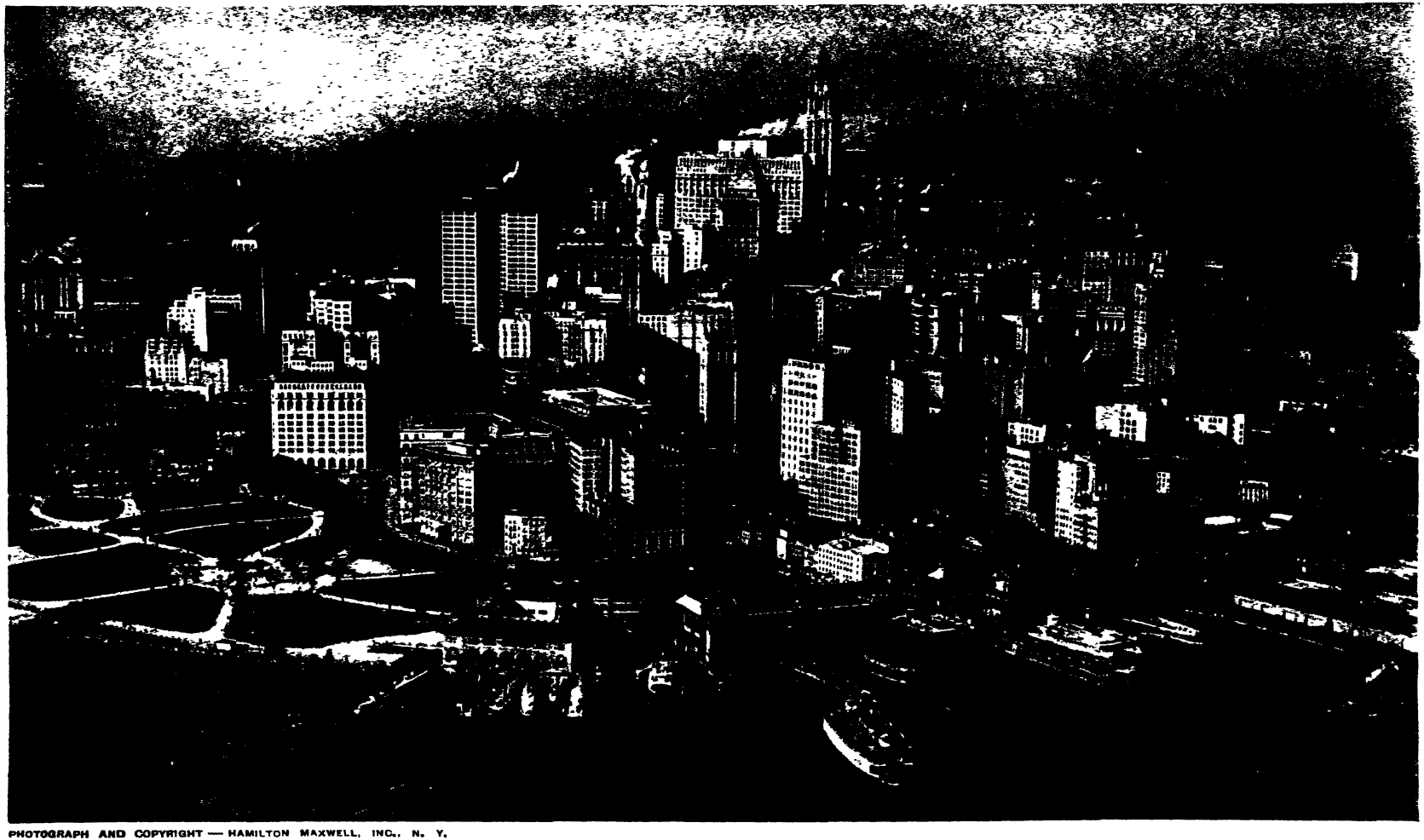
Mining. Although New York has limited metal mining, it ranked thirteenth among the States in 1921 in the value of its mineral products. The most important minerals are clay products, cement, stone, and salt. The progress of the clay and cement industries in the decade was as follows: In 1914 clay products were valued at $9,078,933; in 1916, $11,755,012; 1918, $9,581,796, 1920, $19,113,684; and in 1921, $17,432,086. Shipments of cement in 1914 were 5,713,383 barrels valued at $5,143,401; 1916, 5,707,892 barrels, $5,804,444; 1918, 4,074,159, $6,568,746; 1920, 6,049,150, $12,206,698; 1921, 4,993,341, $9,403,015. It will be noted that while the shipments of cement were practically the same in 1921, the price received was more than double, which was due chiefly to the inflation of currency. In addition to these two minerals, the State produces graphite, a considerable quantity of iron ore, mineral waters, natural gas, petroleum, and sand and gravel The total value of the mineral production in 1921 was $62,567,967, compared with $78,431,317 in 1920; $56,379,564 in 1919; $52,768,877 in 1918; and $36,420,134 in 1914.

Education. There was great progress in education in New York during the decade 1914–24. The Legislature in each year of that period passed a number of important measures.

In 1914, the establishment of the central rural schools was made possible, and in 1917 a measure was passed providing for central high-school districts; in the latter year, school elections in certain cities were regulated by the Legislature; amendments were made to the statutes relating to the boards of education in 1919; and in 1921 and 1922 the laws relating to compulsory education were amended. The Legislature of 1923 also made several important amendments to school laws: $75,000 was appropriated for the erection of an additional building at the State College for Teachers; a measure was enacted requiring the Commissioner of Education to prescribe courses of instruction in fire prevention; and a law was passed providing for State schools of agriculture in St. Lawrence, Alfred, Morrisville, Cobleskill, Delhi, and Farmingdale, under the supervision and direction of the Regents of the University and the Commissioner of Education. Vocational education, in general industrial schools, trade schools, schools of agriculture and home economics (also in part-time or continuation schools), was being carried on in all the larger and most of the smaller cities of the State. The benefits of the Smith-Hughes Act providing for vocational education were accepted by a legislative measure in 1917. Farm schools were established in most of the counties of the State. The registration of pupils increased from 1,532,151 in 1915 to 1,820,506 in 1922; the average attendance increased from 1,233,074 in 1914 to 1,518,781 in 1922. The percentage of illiteracy in the State decreased from 6.6 in 1910 to 6.4 in 1920: among the native white population, from 1.1 to 0.7 per cent; among the Negro, from 5.8 to 3.4. Among the foreign-born white population, it increased from 14.3 to 15.2 per cent.

Finance. For finance, see STATE FINANCES.

Political and Other Events. There was an abundance of political and other happenings in New York in the decade 1914–24. The political complexion of the State was for the larger part of the time Republican, while New York City remained Democratic. Elections were held in 1914 for governor, United States Senator, and members of the House of Representatives. Gov. Martin H. Glynn, who succeeded to the post on the impeachment and removal of Governor Sulzer in 1913, was a candidate of the Democratic party for reëlection The Republican nominee was Charles S. Whitman, former district attorney of New York City. For United States Senator, James W. Gerard, Democrat, was opposed by James Wadsworth, Jr, Republican. Whitman was elected governor, and Wadsworth, Senator. At this election delegates to a constitutional convention were chosen. In February of this year, Joseph Cassidy, former Democratic leader of Queens Borough of New York City, was convicted for selling a nomination for the Supreme Court. With him was convicted William Willett, who paid Cassidy $25,000 for the nomination. An attempt was made by an insane man in April of this year to assassinate Mayor Mitchel. The mayor escaped without serious injury. The constitutional convention authorized in 1914 began its session on Apr. 5, 1915, with Elihu Root as president. The session continued until September 9. The amendments proposed by the convention included woman suffrage and the adoption of a new constitution. The constitution was defeated by a large majority of 470,000; woman suffrage, by a vote of more than 200,000. In 1916 elections were held for United States Senator, governor, and other State officers. Senator Root declined renomination, and the Republicans nominated William M. Calder. A few weeks prior to the nominating primaries, Robert Bacon, former Secretary of State and ambassador to France, announced his candidacy; Calder, however, was nominated by a small majority. The Democratic candidate was William F. McCombs Calder was elected Senator, and Governor Whitman was reëlected. In the presidential voting of this year, Charles E. Hughes received 863,841 votes; President Wilson, 756,946. Elections were held for mayor of New York City and other cities in 1917. Mayor Mitchel was a candidate for reëlection on a Republican-Fusion ticket. The Democrats nominated John F. Hylan, who was elected by a large majority. On Oct. 12, 1917, the new Catskill aqueduct carrying water to New York City was opened. In June of this year a census of all persons of the State under the age of 45 years was taken, with the purpose of assigning all to some sort of service. Two military cantonments were established, one for the National Guard troops at Camp Mills, Mineola, and the other for the National Army at Camp Upton, Yaphank At the former were gathered troops of many States, including the former 69th Regiment of New York. In 1918 nominations were made for governor and other State officers at regular State primaries; the State convention had been abolished. Charles S. Whitman was renominated by the Republicans, and Alfred E. Smith, president of the Board of Aldermen of New York City, was named by the Democrats Smith was elected by a close vote. In 1920 Nathan L. Miller was nominated governor by the Republicans, and Governor Smith was renominated by the Democrats. Mr. Miller was elected, and James W. Wadsworth, Jr., was reëlected to the United States Senate. In the presidential voting of this year Warren G. Harding received 1,868,240 votes; James M. Cox, 781,485. At this election a referendum for a soldiers' bonus providing for a bond issue of $45,000,000 was passed by a large majority. Investigations were held in 1920 by the legislative committee into housing conditions. The committee exposed much corruption in the building trades. In 1921 elections were again held for municipal officers. The chief interest was in New York City, where John F. Hylan was a candidate for renomination. He was opposed by Maj Henry H. Curran, a candidate of various independent organizations. After a violent campaign, Hylan was reëlected by a plurality of more than 400,000 votes. At this election several amendments to the constitution were carried. One of these provided for a literacy test for voting, including the requirement that the voters should know the English language. The Court of Appeals on Aug. 31, 1921, declared the bonus act passed in 1920 unconstitutional. In 1922 a new election law went into effect. This abolished the primaries for certain State offices. Judges and United States Senators were nominated by the convention, while candidates for the House of Representatives, for State Legislature, and for local officers were nominated by primaries. For governor, Nathan I. Miller was nominated by the Republicans, while the Democrats nomi-



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NEW YORK

AIRPLANE VIEW OF THE LOWER PART OF MANHATTAN ISLAND FROM OFF THE BATTERY, 1924

long, to carry the water into the Ashokan reservoir. This was completed and opened in January, 1924.

The War Department ordered three of the piers of High Bridge to be removed from the centre of the Bronx River on the ground that they obstructed navigation. A long discussion followed as to the best method of fulfilling this demand; many urged that the old bridge be remodeled instead of demolished, because of its architectural beauty. In 1923 it was decided to replace the three masonry spans by a single steel arch, which was estimated to cost about $716,000.

Through coöperation of the two States, the New York and New Jersey Harbor Development Commission, called the Port Authority, was appointed in 1917. Its work affects 12 municipalities. Twelve piers between 1026 and 1137 feet long and from 125 to 209 feet wide, connected by rail with all the main railroads of New Jersey, were built on Staten Island in 1920–22. Extensive dredging was carried on to provide a 40-foot channel between Upper Bay and Brooklyn, and Coenties Reef and Shell Reef, which had hindered traffic, were removed. The Central Railroad of New Jersey built the largest coal-handling terminal in New York harbor; it connects by approximately 23 miles of track and cost more than $3,000,000. The Cunard Steamship Line began the construction of a group of eight piers 1000 feet long and one shorter pier at Weehawken, N. J., on the Hudson River, about opposite Thirty-sixth Street.

In 1916 a zoning plan was adopted by the city, to regulate the use to which buildings might be put, their height in relation to street widths, and the percentage of the area of the lots permitted to be covered The commission in charge of framing the plan, which was the first to be adopted by a city of any importance, made a survey of the city and held public hearings. The height of buildings was regulated chiefly by the width of the street on which they fronted, with variations for different parts of the city. A tower covering not more than one-fourth of the area of the lot, however, might be carried to any height; set-backs might also be used to increase somewhat the permitted height for the rest of the building. The Russell Sage Foundation in 1922 announced the inauguration of a project to make an inclusive plan for New York City and its environs as far as Bridgeport, Conn.; West Point, N. Y., and Princeton, N. J., and including all of Long Island and a large part of the New Jersey coast. The preliminary work on the plan consisted of extensive studies by the Foundation along social, economic, and physical lines.

The value of imports through New York increased from $1,040,380,526 in 1914 to $1,797,819,713 in 1923. The exports increased from $864,546,338 in 1914 to $1,518,852,197 in 1922. Bank clearings rose from $83,018,580,016 in 1914 to $213,996,182,727 in 1923. The capital invested in manufacturing rose from $1,364,352,683 in 1910 to $3,013,436,656 in 1919, and the value of the products from $2,029,692,576 to $5,259,477,577 in 1919. The value of the four leading manufactures increased as follows: women's clothing, from $266,471,381 in 1909 to $866,243,561 in 1919; men's clothing, from $218,411,030 to $564,407,739; printing and publishing, from $183,509,157 to $411,138,928; slaughtering, from $95,862,000 to $191,837,831.

NEW YORK, College of the City of. A free municipal college at Washington Heights, New York City, established in 1848 by the Board of Education of the city. The student enrollment rose from 7998 in 1914 to 18,755 in 1924, the faculty from 218 to 480 members, and the annual income from $684,963 to $1,395,678. The number of bound volumes in the main library, exclusive of pamphlets, increased from 47,589 to 66,165, and the volumes in the departmental libraries from 16,565 to about 20,000 volumes. Departments were established during the period in engineering and military science, the departments of Greek and Latin were consolidated into the department of classical languages, the department of natural history was divided into the departments of biology and geology, and the department of political science into departments of economics and government and sociology. A course leading to the degree of Bachelor of Science in Social Science, in addition to the previously existing courses leading to the degrees of Bachelor of Arts and Bachelor of Science, was established in 1916. The Brooklyn branch of the evening session was begun in the following year and the entire evening session was opened to women; also, in 1917, a summer session was established. In 1919, the first professional schools, of Technology and Business and Civic Administration, with their own deans and faculties, were founded, and the college was given the name of the College of Liberal Arts and Science. The work of the School of Business was carried on not only in the Washington Heights buildings and the evening session in Brooklyn, but also at the original building of the college at Twenty-third Street and Lexington Avenue. The third professional School of Education was founded on similar terms in 1921; its work was carried on in the Washington Heights buildings and at various centres in different boroughs in the city. President, Sidney Edward Mezes, Ph.D., LL.D.

NEW YORK PHILHARMONIC SOCIETY. See Music, *Orchestras*

NEW YORK STATE COLLEGE FOR TEACHERS. A coeducational State institution for the training of high-school teachers at Albany, N. Y., founded as a State normal school in 1844, and chartered as the State College for Teachers by the Board of Regents in 1905. Courses are offered in liberal arts and sciences, in commercial education, and in household economics, and a graduate course in education. The student enrollment was increased from 450 in 1914 to 971 in 1923-24, and the income from legislative appropriations increased from $97,000 to $260,000. In 1923, the Legislature appropriated money for the construction of William J. Milne Hall, providing facilities for a practice high school, laboratories in household economics and biology, and a large lecture hall and recitation rooms; and the alumni pledged $150,000 for a residence hall. In addition to a special reference library the college uses the State Library of 1,500,000 volumes, Abram Royer Brubacher became president in 1915.

NEW YORK SYMPHONY ORCHESTRA. See Music, *Orchestras*

NEW YORK UNIVERSITY. A nonsectarian institution in New York City, char-

tered in 1831. The university increased its enrollment from 5233 in 1914 to 16,482 in 1923–24. The Graduate Division of Business Administration was established in 1916; two new degrees were authorized—Master of Business Administration in 1920 and Doctor of Commercial Science in 1923—and the Division of Oriental Commerce and Politics was inaugurated. The Ingram Institute for Economic Education and the School of Retailing were founded in 1918, and the degree of Master of Science in Retailing was authorized in 1921. In 1920, the name of the School of Applied Science was changed to the College of Engineering. A steam engineering plant was built in 1919 and the Sage Engineering Building, for which about $250,000 worth of equipment was assembled, was authorized in the same year. The engineering research laboratory was built at University Heights in 1920–21 at a cost of $345,000. Evening courses were started in the college in 1921, and in 1923 plans were made for courses in aëronautical engineering. During the summer of 1918, the faculties and equipment of the Engineering College were placed at the disposal of the government for training soldiers.

The Medical College was opened to women in 1918. In 1921, the State bacteriological laboratory was built at a cost of $105,000, and the Helen Hartley Jenkins gift of $150,000 was received. Medical preparatory courses were offered at the Flower Hospital, and medical and dental preparatory courses in the evenings at the Washington Irving High School During the War, instruction was given at the college to Medical Reserve Corps officers. The School of Pedagogy was renamed the School of Education and an undergraduate division was established. By arrangement with the Chautauqua Institution in 1923, summer courses in education were given at Chautauqua, N. Y. The Veterinary College was temporarily closed in 1922. The productive endowment increased from $1,225,227 in 1914 to $2,923,988 in 1924, and the budget from $592,391 to $2,353,132. During the 10 years the following buildings were bought or erected: the Trinity building for the Wall Street division of the School of Commerce ($222,670), the university apartment house ($340,000), an addition to the chemistry laboratory at University Heights ($45,000), and a residence house at University Heights ($8650). Five floors of the Washington Square building were taken over and altered for classroom use at a cost of $640,000 and the mortgage was reduced from $550,000 to $350,000, additional space was leased in the Greenwich building, and the Moynihan property was acquired at a cost of $25,000. Between 1914 and 1923, the gifts received totaled $4,031,619. The total assets of the university increased from $5,970,418 to $8,582,692. Chancellor, Elmer Ellsworth Brown, Ph.D., LL.D.

NEW ZEALAND. A British dominion in the southern Pacific, made up principally of North and South Islands, with Steward Island included. Area, 103,862 square miles; population in 1911, exclusive of Maoris, 1,008,468; in 1921, 1,218,913; average annual increase, 2.2 per cent. Estimated population in 1923, 1,271,741. Maoris in that year numbered 53,560. The birth rate in 1921 was 23.34 per 1000 (26.48 in 1912); the death rate, 8.73 (8.87 in 1912); and the marriage rate, 8.69 (8.81 in 1912). In 1922, the excess of immigration over emigration was 7402 (in 1912, 8927). Estimated populations of chief towns, with suburbs, on Apr. 1, 1923 (1911 figure in parentheses): Auckland, 167,760 (102,676); Wellington, 112,070 (70,729); Christchurch, 113,400 (80,193); Dunedin, 75,050 (64,237). At the end of 1922 there were 2550 public primary schools with a registration of 242,466; 36 endowed secondary schools with 10,736 pupils; 146 native schools with 6161 pupils; 4 university colleges with 3683 students. The total expenditure for public education in 1921–22 was £3,497,000; in 1912–13 it had been £1,334,599.

Agriculture. Of the total area of 66,292,232 acres in the Dominion, 27,390,625 acres had been alienated, including 9,978,608 acres reserved by the state, and 5,066,197 acres were held by natives Deducting barren lands, roads, etc., only some 3,000,000 acres remained to be disposed of by 1921. The cultivated area increased, for in January, 1923, 18,417,489 acres were under cultivation, as compared with 16,265,890 acres in 1910–11. The great proportion of the land was under grass seed. The wheat area consistently increased, reaching 352,918 acres in 1922 (189,869 in 1913) while oats showed the greatest loss, dropping from 386,786 acres in 1913 to 170,655 in 1922. Pastoral pursuits were far more important. Over the period 1911–23 these activities held their own. Live stock for 1911 and 1923 showed: horses, 404,284 and 330,818; cattle, 2,020,171 and 3,480,694; sheep, 23,996,126 and 23,081,439; swine, 348,754 and 400,889. Exports of pastoral products for 1913 and 1922 were:

Year	Wool	Frozen Meats	Butter	Cheese
1913	186 533,036 lbs.	2,578,693 cwts	372,258 cwts.	611,633 cwts.
1922	321,533,215 "	3,518,004 "	1,120,200 "	1,161,196 "

During the decade, wool production consistently declined except for the years 1919 and 1922, while dairy products rose regularly. By 1922–23, 41 per cent of the exports were made up of dairy products and only 26 per cent wool.

Manufacturing. From 1910 to 1921 advances in manufacturing were important. While factories only increased from 4402 to 4804, the number of hands increased from 56,234 to 70,255 and capital from £16,731,359 to £39,564,837. The total value of products in 1920–21 was £82,473,569; of this, meat freezing and preserving accounted for £13,669,102; butter and cheese factories, for £19,002,047. Hydro-electric schemes were under consideration after the War because of the decreasing local coal production. A plant was being erected at Mangahao (North Island) which was to supply eventually 160,000 horse power. Similar projects were reviewed for South Island

Mining. Gold production continued to decrease; exports in 1906 were 563,843 ounces; in 1921, 149,595. The coal consumption in 1921 was 1,755,912 tons, of which about one-fifth was imported, mainly from Australia.

Commerce. Imports for 1913, 1920, and 1922–23, were £22,288,302, £61,595,828, and £37,-

330,000. Exports for the same years were £22,986,722, £46,441,946, and £45,549,000. The favorable balance of £8,219,000 for 1922–23, among the highest for the period, was surpassed only in 1915, 1917, and 1919. Proportions of value by countries of origin of New Zealand's imports for 1913 and 1921 were: the United Kingdom, 60 and 50 per cent; other British possessions, 24 and 26 per cent; the United States, 9 and 18 per cent. Proportions for exports were: the United Kingdom, 80 and 87 per cent; other British possessions, 14 and 6 per cent; the United States, 3 and 6 per cent. For 1922–23, imports from the United States dropped to £5,378,000 The most important American products were automobiles and machinery. In 1913, 645 vessels of 1,738,985 tons entered and 635 vessels of 1,699,807 tons cleared New Zealand ports; in 1921, 678 vessels of 1,940,236 tons entered and 678 vessels of 1,944,341 tons cleared.

Communications. In 1923 there were 3028 miles of government-owned railways and only 135 miles of private lines In 1914 government railways aggregated 2863 miles.

Finance and Economic Conditions. Total revenues were, for 1913–14, £11,961,493; for 1921–22, £28,127,000. Total expenditures for the same years were £11,825,864 and £28,466,838. Estimates for 1922–23 were: revenues, £26,250,000, and expenditures, £29,438,215. The public debt in 1914 was £99,730,427; in 1922, £219,054,385, of which war expenditures (1914–19) accounted for £80,000,000 The cost of living steadily mounted over the period 1913–22. Retail price figures, based on the 1909–13 average as 1000, were for 1913, 1034; for 1918, 1346, for 1921, 1620. Wages kept pace, as may be seen by the following index numbers, also based on the 1909–13 average as 1000: 1918, 1231; 1921, 1697.5; 1922, 1746.35. The exchange for the pound sterling was 1913, $4.86; 1921, $3.84, 1922, $4.43; 1923, $4 567

History. The break-up of the Liberal party gave the Reform party its first opportunity in 21 years. On the failure of Sir Joseph Ward to form a ministry and after another unsuccessful attempt on the part of the Liberals, W. F. Massey, leader of the Opposition, created a Reform government on July 10, 1912. For the next decade his dominant personality ruled the political destinies of the Dominion Important administrative reforms were undertaken, aiming at further decentralization in the governmental machinery as well as reformation of the legislative council. The land question, which had always been vexing, was brought nearer to settlement when the law of 1912 allowed settlers on improved land to purchase their holdings. It became evident therefore that the state had relinquished its early policy in the direction of state participation in the benefits of the accumulated unearned increment. The extreme state socialism which had been typical of New Zealand history up to 1911 and which was made possible by the union of the Labor elements with the Liberal party, was abruptly terminated as the industrialization of the country proceeded and the stratification into classes became more perceptible. The farmers had become more conservative as bulwarks were erected for the safeguarding of private property; the laboring classes had become more radical with the appearance of a wealthy group in the population. The result was the growth of the Labor party, on one hand, and on the other, the decision of workers not to accept decrees of the Arbitration Court but to try their strength in the strike. Bitter industrial conflicts became frequent, those of 1912 and 1913 being characterized particularly by ill-feeling.

The War momentarily put a period to all internal questions. Volunteer forces were raised for action in German Samoa; the government was empowered to fix prices and to suspend the labor laws, rent laws were passed (1916), and in 1915 a coalition cabinet was formed for the more effective prosecution of the War. In 1916 a conscription act was passed, though not without opposition, for in 1917, the coal miners went on strike to secure total exemption. Before the end of the War a total of 124,121 men had been enrolled in the army, about 90,000 of them volunteers. War financing was based on loans rather than revenues, although some increases were made in taxation, notably in higher income taxes, stamp duties, customs, railway fares, etc. Beginning with 1916 several loans were floated to an approximate total of £100,000,000. The easy success with which all this was accomplished was due to the unprecedented prosperity which the Dominion enjoyed throughout the War. Most of New Zealand's exports, meats, cheese, wool, hides, sheepskins, were contracted for by the British government, and though prices were fixed, sales reached enormous proportions. By 1921, more than £160,000,000 in produce was sold in this fashion. In spite of the rise in the cost of living, therefore, no class of society was touched by want. Through the fixing of prices of household necessities by the Board of Trade, the importation of wheat in 1918, when a local shortage impended, and the purchase of sugar abroad, retail prices were kept within reason. By the agency of the Court of Arbitration wages were reviewed and increased to meet mounting costs.

In 1919 the coalition came to an end with the withdrawal of Sir Joseph Ward from the cabinet. The election which followed indicated the increasingly radical temper of Labor. The marked syndicalist tinge which industrial agitation had taken on was reflected in the outspoken socialist political platform of the Labor party The election results, however, showed the inherent conservatism of the average voters. Massey's Reform party elected 47 members, the Liberals only 20, and Labor 8, although the popular vote showed a ballot hardly in proportion to the great victory of the Reform party. This was due to the three-cornered fight in most constituencies. Labor troubles continued through 1919 and 1920, and the latter year was marked by a general strike of the railway workers. The world depression of 1921, which struck the farmers in particular, and the general unemployment were reflected in the political realignments. In the 1922 elections the government seats were reduced to 38; Liberals elected 25; Labor, 17. Two questions of importance locally were the status of the repatriated soldiers and the vote on prohibition. Beginning with 1915 pension and settlement acts were put on the statute-books, so that by 1921 upward of 35,000 pensions had been granted and more than 7000 soldiers settled on the land A repatriation department was created for the vocational guidance of men who had fought in the War. By 1922 more

than £30,000,000 had been spent in this work of repatriation. Polls continued to be taken on national prohibition. By the law of 1918 a triennial vote was ordered on three alternatives, prohibition, license, and state control. A majority of the total vote cast was made necessary for passage. The 1919 vote gave prohibition only a plurality. The same was true also of the 1922 vote

The appointment of Lord Jellicoe in 1920 as governor general of the Dominion brought the question of national defense to the forefront as an issue of major importance. The question of an independent New Zealand naval unit came up for serious consideration time and again. The Dominion appeared to accept complacently its status under the Empire, and although it had a place as a member of the League of Nations and also had a mandate over German Samoa, there was no movement in public opinion toward a wider independence.

NEY, ELLY (1882–). A German pianist, born at Düsseldorf. After graduation from the Cologne Conservatory, where her teachers were I. Seiss and K. Böttcher, she went for further study to Leschetizky and Sauer in Vienna and won both the Ibach and the Mendelssohn prizes For several years she taught at the Cologne Conservatory. Her tours of Germany, Austria, Russia, and Scandinavia established her reputation as one of the greatest of contemporary pianists, irrespective of sex. At her American début (New York, Oct. 15, 1921) she took her audience by storm and immediately became a prime favorite. She later made annual tours of the States. In 1911 she married the Dutch conductor, Willem Van Hoogstraten.

NICARAGUA. The largest of the Central American republics, with an area estimated at 49,200 square miles; population (according to census of 1920), 638,119 In 1910 the population was estimated at 600,000. At least 75 per cent of the inhabitants lived in the western half of the country. Capital, Managua, with a population of 60,342. Other large towns are: Leon (47,234), Granada (21,925), Matagalpa (32,271), Masaya (17,287). Illiteracy among the population was still high, and school attendance was not much in excess of that of 1912 In 1922–23 there were 344 elementary schools with 21,657 pupils.

Industry and Trade. The agricultural products of the western half were varied; coffee, sugar cane, wheat, cacao, and beans were grown. The average annual crop of coffee was placed at 25,000,000 pounds. In 1921, the export value of coffee was $2,352,487, and the 1922 exports were worth $2,300,572. Sugar exports in 1921 were worth $91,308,653. The sugar industry took its inception from the great demand created during the War. Exports of sugar in 1916 totaled only 3034 metric tons; in 1922, this export was 9948 tons. The export to the United States alone in 1923 was valued at $842,697. The banana was the principal crop grown in the east. The banana exports in 1923 were 3,487,985 stems, compared with 2,617,765 in 1922. Timber and forest products also played an important part in Nicaragua's foreign trade. Gold exports averaged $1,000,000 yearly. Practically all exports of lumber and gold went to the United States. In 1922 imports into Nicaragua were valued at $5,123,505 ($5,604,300 in 1913); exports in 1922, $7,903,446 ($7,494,100 in 1913). Proportions in 1922 by countries of origin of imports were: the United States, 80 per cent (50 in 1912); the United Kingdom, 9 per cent (19 in 1912); France, 2 per cent (5 in 1912); Germany, 1 per cent (12 in 1912). Leading imports were cotton goods, chemicals, iron and steel, and wheat flour. Proportions in 1922 by countries of destination of exports were: the United States, 71 per cent (46 in 1912); France, 16 per cent (16 in 1912); the United Kingdom, 3 per cent (13 in 1912). The 1919 foreign trade was the largest in the history of the country; this was due to the excellent return received for the large coffee crop. Total exports were $12,409,473. Almost 28 per cent of Nicaragua's exports were taken in that year by France. France's decision to resume her high duties on coffee accounted for the decreased value of shipments in the ensuing years. The isolation of the Atlantic coast, with communications between the west and the east by way of Costa Rica and Panama, led the government to survey a route from San Miguelito on Lake Nicaragua to Monkey Point on the Atlantic, and in 1921 a loan of $9,000,000 was secured in New York for this and other purposes. The national railways also passed into the hands of New York bankers for $2,000,000. In 1920 also, work was begun on a railway from Chinandega to Playa Grande on the Gulf of Fonseca, as a link in the International Railways chain. Total railway mileage in January, 1924, was 145 miles, exclusive of small private lines. There were 3637 miles of telegraph wire and 805 miles of telephone wire in 1921.

Finance. For 1921–22 revenues were $2,803,244 ($2,479,313 in 1914) and expenditures $2,787,673 ($1,980,328 in 1914). Total external debt in February, 1922, was $5,911,362; internal debt, $3,462,884. As a result of the ambitious financial scheme of 1917, the size of the debt consistently decreased. By the programme a rigorous budget was laid out; financing of deferred interest was provided for; the floating debt was settled. Credit so improved that in 1921 a loan of $9,000,000 was raised, part of which was to be applied toward the redemption of the 1909 bonds. The total indebtedness of Nicaragua on Mar. 31, 1923, was $9,294,781. On Dec. 31, 1923, there were only 2,581,609 cordobas (1 cordoba = $1) in circulation.

History. The continued interest of the United States in Nicaraguan affairs aroused the hostility of other Central American republics, and two of these, Costa Rica and Salvador, were led to sue Nicaragua in the Central American Court of Justice when the Bryan-Chamorro treaty was finally ratified by both parties in 1916. By this instrument, for the payment of $3,000,000 the United States acquired exclusive canal rights in Nicaragua, permission to construct a naval base on the Gulf of Fonseca, and the Corn Islands. Though the suits were successful, the decision was disregarded by Nicaragua and the United States. The continued stay of American marines in the country ensured the permanence of the government in power. Border outbreaks in 1921 and revolutionary disturbances in 1922, which for a time led to an attack on Chinandega by rebels, and a move on the capital in August, 1922, caused the holding of a conference by the presidents of Nicaragua, Honduras, and Salvador, on board the U.S.S. *Tacoma* in Fonseca Gulf on Aug. 22,

1922. Steps were taken to check revolts fomented by political emigrants and for the putting down of border uprisings by united action. The purpose of the general treaty of peace and friendship signed on Dec. 20, 1907, by all the Central American countries was reaffirmed. This move, fostered by Nicaragua, was in strange disharmony with its refusal to join the Central American Union erected in 1921. Nicaragua did, however, participate in the subsequent Central American conference at Washington and in the treaties signed there. (See CENTRAL AMERICAN UNION.) On May 8, 1917, Nicaragua declared war on Germany and as an Associate Power became an original member of the League of Nations. The president for 1916–20 was Emiliano Chamorro; for 1920–24, Dr. Diego Manuel Chamorro. The untimely death of Dr. Chamorro on Oct. 19, 1923, necessitated the ad interim assumption of presidential powers by the vice president, Bartolomeo Martinez, pending the election of a new president in October, 1924. For this election a new electoral law, drafted by an American, Dr. H. W. Dodds, secretary of the National Municipal League, had been adopted, and Dr Dodds was invited to assist in installing the new system. An offer by the Washington government to withdraw the force of American Marines which had been stationed in Nicaragua since 1912, unless the Nicaraguan government desired their continued presence to safeguard electoral freedom, elicited the reply that the Nicaraguan government desired the Legation guard to remain at least until the installation of a new administration in January, 1925

NICHOLAS (NIKOLAI NIKOLAIEVITCH), GRAND DUKE (1856–). A Russian general (see VOL. XVII). At the outbreak of the War he was given the supreme command of the Russian armies, and handling them with admirable skill, successfully overran East Prussia and caused such rearrangement of German plans as to relieve materially the hard-pressed French and British. Although defeated at some points by the great masses of Prussian shock troops hurled against him, he succeeded in extricating his armies from awkward positions in the Carpathian passes, and the Allies esteemed it a tragedy of first magnitude when domestic politics in 1915 induced the Czar to take Nicholas's place himself. The Grand Duke was sent to the Caucasus and there carried out the successful campaigns of Erzerum and Trebizond. After the revolution he lived in retirement, first in the Crimea, and then in a small village near Paris. In 1924 conservative Russians everywhere looked to him as the man most likely to accomplish national restoration in Russia.

NICHOLAS II (1868–1918). Emperor of Russia from 1894 (see VOL. XVII). The reactionary influences about the Emperor and his fatalistic temper prevented him from making any effective resistance during the early part of the War to those intent on his downfall. In March, 1917, when the President of the Duma telegraphed him demanding his abdication, he submitted with very little protest. He abdicated in favor of Grand Duke Michael, refusing to hand the power over to his son for fear of exposing the latter to the political storm that was brewing. The Grand Duke declined to accept the honor, unless the crown was tendered to him by the will of the people. At first it was planned to send the Imperial family to England, but the Provisional Government would not allow this, and Nicholas and his wife, son, and four daughters were transferred from Pskov to Tsarskoe Selo and then to Tobolsk, where they remained for several months. In 1918 they were taken to Ekaterinburg and given an apartment of only three rooms, and when Kolchak advanced in the Ural, the Communists, at a secret meeting, decided to put the Czar and his family to death. They were all shot in the cellar of the house where they had lived, and their bodies were removed to an isolated spot near Ekaterinburg and burned A few pieces of their clothing were afterward found at the place.

NICHOLS, ERNEST FOX (1869–1924). An American physicist (see VOL. XVII). He was professor of physics at Yale University from 1916 to 1920, director of pure science at the Nela Research Laboratories at Cleveland, Ohio, during 1920–21; and president of the Massachusetts Institute of Technology from March to November, 1921.

NICHOLS, J(ESSE) BROOKS (1885–). An American manufacturer, born at Dunkirk, N. Y., and educated at Yale University. From 1922 he was first vice president of the Franklin Baker Company, manufacturers of coconut products. After attending the Plattsburg Training Camp, he was commissioned first lieutenant in the United States Army, in 1916. He was later promoted to be captain and major and served in the North Russian campaign in 1918–19. He received the Croix de Guerre and other decorations from foreign countries. In 1920 he was commissioned lieutenant-colonel in the Officers' Reserve Corps.

NICHOLSON, WILLIAM (1872–). A painter and engraver, born at Newark, England, and educated at the Magnus School in Newark and at the Julien Academy at Paris As a student he produced good experimental work in wood engraving by using bold masses of black and white or of sombre grays and browns relieved by touches of bright color. He engraved many portraits, illustrated books, and collaborated with James Pryde in designing posters under the name of the Beggarstaff Brothers. During the War he contributed to the set of lithographs, "Britain's Aims and Ideals." As a painter he is known best for interior and still life subjects, although he has painted portraits and landscapes. He is represented in the Luxembourg and in many English galleries.

NIEHAUS, CHARLES HENRY (1855–). An American sculptor (see VOL. XVII). He has been remarkably prolific during recent years. His works include the Paul Jones monument at Washington, D. C.; the Commodore Perry monument, Buffalo, N. Y.; statues of Zachariah Chandler and Governor Click, National Capitol; Hernandez Cortez, Panama-Pacific Exposition; Francis Scott Key Memorial, Baltimore (1922), and war memorials at Hoboken and Newark, N. J.

NIELSEN, FRED KENELON (1879–). An American lawyer, born in Denmark, and educated at the University of Nebraska and the law department of Georgetown University. After admission to the bar he practiced law in Washington and was special agent of the General Loan Office from 1909 to 1911. From 1913 he was assistant solicitor to the Department of State, and in 1914, delegate at the con-

ference to conclude the treaty for the government of Spitzbergen. He served during the War as a major in the United States Army. At the Paris Peace Conference he was in charge of matters relating to treaties and claims against the enemy governments, and he was American representative in the drawing up of other treaties. President Wilson appointed him solicitor for the Department of State in 1920. He was reappointed to this position by President Harding. He served as technical expert at the Disarmament Conference in 1921–22.

NIELSEN, LUDOLF (1876–). A Danish composer, born at Nörre-Tvede, Denmark. At the Copenhagen Conservatory he studied under V. Tofte (violin), A. Orth (piano), and F. Hartmann (composition), and in 1903–04 he attended the Leipzig Conservatory As winner of the Ancker stipend he spent the year 1907 in travel and study in Germany, Austria, and Italy. From 1897 to 1907 he was solo violist and assistant conductor of the Tivoli orchestra and viola of the Björvig Quartet. He later lived in Copenhagen as teacher and composer. He wrote two operas, *Isabella* (Copenhagen, 1915) and *Uhret* (not produced up to 1924); three symphonies; the symphonic poems *Ragnar Lodbrog, Sommernatsstemning, In Memoriam, Fra Bjaergene,* and *Babelstaarnet; Romanze* for 'cello and orchestra; *Herbstabend,* recitation with orchestra; *St. Hans* for baritone, chorus, and orchestra; two string quartets; and choruses, songs, and piano numbers.

NIEMEN RIVER. See MEMEL.

NIGERIA. A British colony and protectorate in West Africa. The colony has an area of 1400 square miles; the protectorate, made up of the northern and southern provinces, has an area of 335,000 square miles. The total population was about 18,500,000, of whom 2800 were Europeans. The leading products of economic importance, measured by exports, were: nuts and palm kernels, exports in 1913, £3,109,818; in 1921, £3,574,184; palm oil, exports in 1913, £1,854,384; in 1921, £1,653,387; raw cotton, exports in 1913, £159,223; in 1921, £530,280; cocoa, exports in 1913, £157,480; in 1921, £350,085; tin, exports in 1913, £568,428; in 1921, £714,659; ground nuts, exports in 1913, £174,716; hides and skins, exports in 1913, £197,214; in 1921, £175,567. Other products were rubber, mahogany, ivory, live stock, ostrich feathers, and capsicums. Exports for 1913, 1920, and 1923, were £7,352,377, £16,987,018, and £11,672,000. Imports for the same years were £7,201,819, £25,216,507, and £11,457,000 Leading imports in 1921 were cotton piece goods and coopers' stores. High prices accounted for great advances manifested in the trade records of the years immediately following the War, though the year 1921 saw its world-wide depression reflected in Nigeria too. Shipping figures indicate the state of affairs: tonnage entered and cleared for 1913, 1920, and 1921 was 1,735,036 tons, 1,434,222, and 832,721. The importation of spirits was prohibited in 1919 with the result that a customs tax was placed on exports to fill out the territory's revenues Imports came mostly from the United Kingdom and the British colonies. In 1921, however, imports from the United States totaled £811,237. In 1923, of the total trade, 75 per cent was with the United Kingdom, 8 per cent with the United States, and 8 per cent with Germany. In 1924, 1250 miles of railway were open. Since 1914 an important line completed was the Port Harcourt-Enugu Ngwo of 151 miles, which opened up the colliery at Enugu Ngwo. Plans were laid for the extension of this railway to the north beyond the Benue River, to reach to Makurdi on the Benue in 1914. There was a network of excellent motor roads in the southern provinces, as well as several thousand miles of telegraph wire.

The cost of government mounted during the period 1914–24. Revenues increased from £3,462,507 in 1913 to £5,734,961 in 1924–25 (estimated), and expenditures from £2,916,801 to £5,995,582. The debt in 1913 was £8,267,569; in 1922, £13,609,209 The system of administrative centralization inaugurated in 1914 was continued. In 1917 an uprising in the West gave the government some concern, but it was soon checked. In 1923, to extend more fully the idea of local autonomy, the British government granted the whole of Nigeria a new constitution, embodying a provision for the erection of a legislative council

NINE POWER OPEN DOOR TREATY. See CHINA, *History*

NITROGEN, FIXATION OF. See CHEMISTRY; FERTILIZERS

NITTI, FRANCESCO SAVERIO (1868–). An Italian statesman and author. He occupied many positions in the government and from 1911 to 1914 was Minister of Agriculture, Industry, and Commerce. He favored Italian intervention on the side of the Allies in the War and was a member of the special Italian mission to the United States in 1917. On his return he was appointed Minister of the Treasury. On the fall of the Orlando ministry in June, 1919, he became Prime Minister and held this office until May, 1920. He was for a time professor of economics at the University of Naples.

NIVELLE, ROBERT GEORGES (1856–1924). A French soldier, of English ancestry on his mother's side. He entered the artillery service of the army and at the outbreak of the War was a colonel. He greatly distinguished himself in the retreat from Mons and in the battle of the Marne in September, 1914, and was promoted to be chief assistant of General Pétain in the defense of Verdun. He succeeded to command in that sector and initiated and carried out a counteroffensive which, on Oct. 24, 1916, regained the forts of Douaumont and Vaux. He was appointed successor to General Joffre as commander-in-chief of the French armies of the North and East on Dec. 12, 1916. He planned and undertook a grand offensive on the Aisne front which failed to dislodge the Germans and resulted in immense losses to the French in April and May, 1917; on May 15 he was relieved of his post as commander-in-chief He was placed in command of the French forces in North Africa and held this position until 1919.

NOGUCHI, HIDEYO (1876–). A Japanese-American pathologist (see VOL. XVII). Dr. Noguchi's most striking achievement after joining the staff of the Rockefeller Institute was the discovery of the microörganism causing yellow fever. (See YELLOW FEVER.) In 1923 he published *Laboratory Diagnosis of Syphilis.*

NOLEN, JOHN (1869–). An American landscape architect and city planner, born at

Philadelphia, and educated at Pennsylvania, Munich, and Harvard Universities. From 1903 he was engaged in practice in Cambridge, Mass. His more important work includes the plans for the Agricultural School and Smith College at Northampton, Mass., for public institutions for Wisconsin, and for many private houses He drew comprehensive city plans and reports for the improvement of Roanoke, Va , Sacramento, Cal., and many other cities. During the War he was a member of the advisory housing committee of the Emergency Fleet Corporation and was consultant and designer for several towns for the United States Housing Corporation. His many writings on architectural subjects include *Madison, a Model City* (1910), and *New Ideals in the Planning of Cities, Towns, and Villages* (1919).

NORDAU, MAX SIMON (1849–1923). A Jewish author of Hungarian birth (see VOL. XVII). His reputation rests on his *Degeneration* (1895), which overshadowed all his subsequent works He was a resident of Paris and died there. His last publications were *Menschen und Menschliches von Heute* (1915) and *Franzosische Staatsmanner* (1916). He remained an ardent Zionist

NORDEN, N. LINDSAY (1887–). An American organist and composer, born in Philadelphia. He received his musical training in New York under M. Spicker, F. W. Robinson, A. Weld, and later, at Columbia University, under Prof C. Rybner From 1905 to 1909 he was musical director at St Mary's, and from 1909 to 1917, at All Saints' in Brooklyn. In 1917 he was appointed W W Gilchrist's successor as conductor of the Mendelssohn Club in Philadelphia, where he settled permanently the following year as organist and choirmaster at the Second Presbyterian Church, choirmaster at St. Paul's, and teacher at the Delancey School. In 1920 he became conductor of the Reading Choral Society, producing oratorios and choral works in the larger forms. Having become interested in the à cappella music of the Russian liturgy, of which he made a special study, he organized in 1912 the Æolian Choir of 60 trained voices, which he conducted until 1917, introducing to concert audiences works never heard in the United States outside the regular service in some of the larger Russian churches. This pioneer work he continued in Philadelphia with his choir of the Second Presbyterian Church. He edited a large collection of this music, about 80 numbers, with English translation His original compositions include an overture, *King Melville;* an orchestral sketch, *Silver Plume*, a cantata, *Thanatopsis*, many motets, anthems, and services and songs

NORDENSKIÖLD, NILS ERLAND HERBERT, BARON (1877–) A Swedish anthropologist (see VOL XVII) He wrote *Forskningar och Aventyr i Sydamerika* (1915), *An Ethnogeographic Analysis of the Material Culture of Two Indian Tribes in the Gran Chaco* (1919); *The Changes in the Material Culture of Two Indian Tribes under the Influence of New Surroundings* (1920); *The Copper and Bronze Ages in South America* (1921), *Deductions Suggested by the Geographical Distribution of Some Post-Columbian Words Used by the Indians of South America* (1922), and, in German, *Indianer und Weisse in Nord Ost Bolivien* (1922), and *Traumsagen aus den Anden* (1922).

NORDEN SOCIETY. See NORWAY, *History.*

NORDIC. See RACE PROBLEMS.

NOREEN, ADOLF GOTTHARD (1854–). A Swedish philologist of high reputation, many of whose works have been translated (see VOL. XVII) Since his book on Swedish names of places, he has published other works including an edition of Marcus Borgström's *Svenska Sprakets Historia for Folkskolseminarier* (1916).

NORFOLK. A port of entry for Virginia and the second port on the Atlantic coast in volume of exports. The population increased 71.6 per cent from 67,452 in 1910 to 115,777 in 1920 and to 164,105 by estimate of the Bureau of the Census for 1924. During the War the Federal government built an army base terminal at a cost of $29,000,000, which was afterwards leased and operated by the city. In 1918, the commission-manager type of government was adopted; city planning and zoning were established. A new $5,000,000 water system, adequate for a city of 1,000,000 population, was procured, two junior high schools and an industrial high school for negroes were built at a cost of $500,000 apiece, and 15 playgrounds were established and equipped. A municipal grain elevator and terminal of eight warehouses was built in 1923 at a cost of $5,000,000, and a municipal market was completed in the same year. Private building operations amounted to $5,368,971 in 1923, an increase of 110 per cent in 10 years; bank clearings to $417,592,524, an increase of 94 per cent, and the city budget to $7,234,148, an increase of 428 per cent. The total annual value of port commerce increased more than 800 per cent during the same period.

NORFOLK ISLAND. See PACIFIC OCEAN ISLANDS

NORMAL COLLEGE OF THE CITY OF NEW YORK. See HUNTER COLLEGE.

NORRIS, GEORGE WILLIAM (1861–). American legislator (see VOL XVI). He was reëlected to the United States Senate in 1918. He was one of the most prominent leaders of the so-called Progressive wing of the Republican party in the Senate and formed one of the "agricultural bloc" He was a candidate for reëlection in 1924

NORRIS, JAMES FLACK (1871–). An American chemist, born at Baltimore, Md , and educated at Johns Hopkins University During 1895–1904 he was connected with the chemical department of the Massachusetts Institute of Technology and in 1904 became professor of chemistry at Simmons College, but in 1915 he accepted a call to Vanderbilt University, where he remained a year He returned to the Institute of Technology and in 1920 became professor of organic chemistry there. He lectured on his specialty at Harvard (1912–14) and Clark University (1913–14). His original investigations have been chiefly in organic chemistry. He was an associate on the Naval Consulting Board in 1916 and during 1917–18 was connected with the gas defense work of the Bureau of Mines He served later in the Chemical Warfare Service, with the rank of lieutenant-colonel, and inspected the war gas factories of Germany. Dr Norris is the author of *The Principles of Organic Chemistry, Experimental Organic Chemistry,* and a *Textbook of Inorganic Chemistry.*

NORRIS, KATHLEEN (THOMPSON) (1880–). An American novelist (see VOL. XVII). Among her later books are *The Treasure*

(1915); *The Story of Julia Page* (1915); *The Heart of Rachel* (1916); *Undertow* (1917); *Martie, the Unconquered* (1917); *Josslyn's Wife* (1918); *Sisters* (1919); *Harriet and the Piper* (1920); *The Beloved Woman* (1921); *Lucretia Lombard* (1922); *Certain People of Importance* (1922); *Butterfly* (1923); and *The Callahans and the Murphys* (1924).

NORTH CAROLINA. North Carolina is the twenty-seventh State in size (52,426 square miles), and the fourteenth in population; capital, Raleigh. The population increased from 2,206,287 to 2,559,123, a gain of 16 per cent. The white population increased from 1,500,511 to 1,783,779; negro, from 697,843 to 763,407; native white, from 1,494,569 to 1,776,680; foreign-born (a very small proportion of the population), from 5942 to 7099. Both urban and rural populations increased during the decade: the former from 318,474 to 490,370; the latter from 1,887,813 to 2,068,753. The growth of the principal cities was as follows: Winston-Salem, 22,700 (1910), to 48,395 (1920); Charlotte, 34,014 to 46,338; Wilmington, 25,748 to 33,372; Asheville, 18,762 to 28,504.

Agriculture. As North Carolina is one of the cotton-producing States, it has been considerably affected by the advance of the boll weevil, which reached the State about 1920–21. The ravages of these insects, however, vary with the intensity of the winter (the cold killing many of them), so that while there was serious destruction in some sections, the effect on production was not as marked as it was farther South. The acreage planted to cotton in 1913 was 1,576,000 and the production 792,000 bales; in 1915, 1,282,000, 699,000 bales; in 1918, 1,600,000 and 898,000, in 1920, 1,587,000 and 925,000; in 1922, 1,626,000 and 852,000. The estimated production in 1923 was 877,000 bales. See COTTON; also BOLL WEEVIL.

While the population of the State increased 16 per cent in the decade 1910–20, the number of farms increased 6.3 per cent (from 253,725 to 269,763). The acreage of land in farms, however, showed a decrease of 10.8 per cent, or from 22,439,129 to 20,021,736; and the improved land in farms decreased 7 per cent, from 8,813,056 to 8,198,409 acres. The total value of farm property showed an apparent increase of 132.5 per cent in the decade, or from $537,716,210 to $1,250,166,995; the average value per farm, from $2119 to $4634. In interpreting these values and all comparative values in the decade 1914–24, the inflation of currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the 269,763 farms in 1920, 151,376 were operated by owners, 928 by managers, and 117,459 by tenants. The corresponding figures for 1910 were 145,320, 1118, and 107,287. White farmers in 1920 numbered 193,473, compared with 188,069 in 1910; colored farmers, almost entirely negroes, numbered 76,290, compared with 65,656. Farms free from mortgage in 1920 numbered 102,950, and those under mortgage, 24,499; in 1910, 117,028 were free from mortgage and 26,642 were mortgaged. The total number of cattle in 1920 was 644,779, of which 462,077 were dairy cattle; in 1910 the total number was 700,861 (308,914 dairy cattle). Sheep, in 1920, numbered 90,556, compared with 214,473 in 1910; hogs, 1,271,270, compared with 1,227,625. The estimated production of the principal farm crops in 1923 was as follows: corn, 54,405,000 bushels; wheat, 6,038,000 bushels; oats, 3,828,000 bushels; potatoes, 3,861,000 bushels; sweet potatoes, 10,126,000 bushels; tobacco, 355,266,000 pounds; hay, 657,000 tons. Comparative figures for 1913 are: corn, 55,282,000 bushels; wheat, 7,078,000; oats, 4,485,000; potatoes, 2,400,000; tobacco, 167,500,000 pounds.

Manufactures. While North Carolina is not one of the leading manufacturing States, it has great industrial importance. In 1920, there were 14 cities of more than 10,000 inhabitants, which formed 12.1 per cent of the total population; and in 1919 these reported 42.2 per cent of the value of the State's manufacturing products. There were in the State 4931 manufacturing establishments in 1909; 5507 in 1914; and 5999 in 1919. Persons engaged in manufacture numbered 133,453, 151,335, and 175,423; and the capital invested amounted to $217,185,588, $253,841,808, and $669,144,096, in those years. The value of the product in 1909 was $216,656,055; in 1914, $289,411,987; and in 1919, $943,807,049. The large increase in value of products was due largely to changes in industrial conditions brought about by the War, and cannot be properly used to measure the growth of manufactures during the census period, 1914–1919, but the increase in number of persons engaged in manufacture clearly indicates steady growth in the manufacturing importance of the State. The manufacture of cotton ranks first in point of value of product in 1909, $72,680,000; 1914, $90,744,000; and 1919, $318,368,000. The manufacture of tobacco, cigars and cigarettes ranks second in this respect, valued in 1909 at $35,987,000; 1914, $57,861,000; and 1919, $259,824,000. Lumber and timber products, third in value, amounted to $33,525,000 in 1909; $39,632,000 in 1914; and $69,580,000 in 1919. The manufacture of cotton-seed oil and cake, next in order, had a product valued at $8,504,000 in 1909; $15,269,000 in 1914; and $46,995,000 in 1919. The chief manufacturing cities of the State are Winston-Salem, Durham and Charlotte. In Winston-Salem, there were 66 manufacturing establishments in 1909, with a product valued at $18,240,000; 73 in 1914, with $37,288,000; and 93 in 1919, with $200,485,000. Durham had 60 manufacturing establishments in 1909, with a product valued at $23,027,000; 62 in 1914, with $27,597,000; and 74 in 1919, with $70,659,000. Similar figures for Charlotte were: 108 in 1909, with $10,460,000; 107 in 1914, with $10,962,000; and 111 in 1919, with $43,096,000. Other important manufacturing cities are Greensboro, Raleigh, New Bern, Wilmington and Asheville.

Education. The educational problems in North Carolina are those of the other southern States that have a large colored population. During the decade 1914–24, steady progress was made. Schools were reorganized in 1919 and provision was made for a State Equalizing Fund, the purpose of which is to distribute as equally as possible the burden of supporting the county schools; the General Assembly had been setting apart a fund for this purpose for several years. The General Assembly of 1921 inaugurated a greatly improved tax system, which renders easier the raising of money for educational purposes. There was being developed in the State a system of public schools with the county as the unit of administration, in

contrast to a tendency in former years for the county to break up into small districts chartered by the General Assembly and made independent of the county authorities. The decision of the courts and legislative acts during the decade tended to make the county the unit and to bring all the small local tax or special charter districts under county control, giving to the county board of education very broad powers. The growth of the community high school was remarkable, especially in the last three years of the decade, the county districts being given as good high-school advantages as the towns and cities. Vocational training in agriculture and home economics was carried on in the public schools, having been made possible through acceptance of the provision of the Federal act that appropriates Federal funds to the States for this purpose The Legislature of 1921 created a Division of Negro Education, which was given general charge of the supervision of Negro schools in the State, and will undoubtedly result in great improvement in the schools. The school enrollment increased from 520,404 in 1910 to 752,698 in 1922; in the public high schools from 14,407 to 48,831. The total expenditure increased from $3,178,950 to $21,649,695. The percentage of illiteracy in the State decreased from 22 6 in 1910 to 16.9 in 1920: among the native white population from 15 to 10.7; among the foreign-born, from 8 1 to 7; among the negro, from 21 2 to 18.9

Finance. For finance, see STATE FINANCES.

Political and Other Events. North Carolina, in the decade 1914–24, remained steadily Democratic. In 1914 elections were held for United States Senator; Senator Overman was reelected. Democratic Representatives were elected to all districts except one In 1916 elections were held for governor and State officers. Thomas W. Bickett, nominated by the Democrats, was elected over the Republican nominee, Frank W Linney In the presidential voting, President Wilson received 168,383 votes; Charles E Hughes, 120,890. In 1918 elections were held for United States Senator and for other officers. Senator Simmons was reëlected Cameron Morrison, Democratic candidate, was elected governor in 1920, and Lee S. Overman was reëlected to the Senate. In the presidential voting of this year, J. M. Cox received 305,447 votes; and W G Harding, 232,848. The voters in 1922 rejected a proposed amendment to the constitution to increase the pay of members of the Legislature from $4 to $10 a day. Minor State officers were chosen at this election

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. In 1915 a proposed woman suffrage amendment was defeated in the House by a vote of 67 to 32. Bills designed to bring about an enforcement of the law against child labor also failed to pass. Measures regulating the sale of liquor in the State were enacted. In 1917 the Legislature amended the laws relating to criminal procedure, created a budget system, and provided for the voting of citizens absent in the national service. A commission was appointed to make a survey of the educational system. In 1919 the Legislature adopted the Federal prohibition amendment, on January 4 This Legislature also enacted measures forbidding child labor and passed an act requiring compulsory school attendance for children under 14 years of age. In the session of 1921 the banking institutions of the State were regulated, and provision was made for their more thorough supervision. Laws relating to attempted bribery were amended, and measures were passed for the promotion of coöperative marketing of farm products. A provision was also made for a State system of roads and for the development of agriculture and industry. The Legislature also made provision for the issue of bonds to enlarge and improve the educational and charitable institutions of the State. In 1923 a measure was passed by the Legislature creating a board to supervise the taxes of the State. A prohibition law was repealed and a law substituted providing prohibition against the transportation, manufacture, or sale of liquors containing more than .5 per cent alcohol. At this session was also created a system of mothers' pensions.

NORTH CAROLINA, UNIVERSITY OF A State institution at Chapel Hill, N C, founded in 1795. The university expanded considerably between 1914 and 1923–24, with a faculty of 85 and an enrollment of 981 in the former year as compared with a faculty of 165 and an enrollment of 2130 in the year 1923–24 and 1817 in the summer of 1923 The library was also increased during the decade from 75 000 to 119,625 volumes, and the income was increased from $170,000 to $927,774.25, of which $75,000 annually comes from the bequest of Mrs Robert W. Bingham received in 1917 and $40,000 from the gift of the General Education Board in 1920. Four new dormitories and three class buildings were put up between 1921 and 1923, and State funds were available in 1923–25 for four other dormitories and a building for the department of chemistry. A Student Union was being erected in 1923 from alumni subscription, and an Alumni Club from a private gift Harry Woodburn Chase succeeded Edward K. Graham, who died in 1918, as president

NORTHCLIFFE, ALFRED CHARLES WILLIAM HARMSWORTH, FIRST VISCOUNT (1865–1922). A British newspaper publisher (see VOL. XVII). His activities at the outbreak and during the course of the War were in many cases highly effective. He was strongly opposed to the administration of Lord Kitchener and was instrumental in bringing about his removal. Through his efforts also, the munitions department was placed on an efficient basis. He was an ardent supporter of Lloyd George and had much to do with the latter's accession to the premiership In 1917 he was appointed director of the Civil Aërial Transport Committee and chairman of the British War Mission to the United States; in the following year he was director of propaganda in the enemy countries. For his services during the War, he was created viscount in 1917 He died after a long siege of ill health on Aug. 14, 1922. He published several books, including one of his experiences at the front during the War.

NORTH DAKOTA. North Dakota is the sixteenth State in size (70,837 square miles), and the thirty-sixth in population; capital, Bismarck. The population increased from 577,056 in 1910 to 646,872 in 1920, a gain of 12.1 per cent. The white population increased from 569,855 to 639,954, the native white increasing from 413,697 to 508,451. The number of Indians decreased from 6486 to 6254; negroes, from 617 to 467; foreign-born whites, from

156,158 to 131,503. Both urban and rural populations mounted, the former from 63,236 to 88,239; the latter from 513,820 to 558,633. The growth of the principal cities was as follows: Fargo, 14,331 (1910), to 21,961 (1920); Grand Forks, 12,478 to 14,010; Minot, 6188 to 10,476.

Agriculture. As North Dakota is one of the largest grain-producing States, agricultural conditions in the decade 1910–20 were affected by the fluctuations in price and production of wheat and other grains resulting from conditions during and following the War. An account of the general agricultural situation will be found under AGRICULTURE, CORN, WHEAT. While the population of the Sate showed a growth of 12.1 per cent in the decade, the number of farms increased 4.5 per cent (from 74,360 in 1910 to 77,690 in 1920); the total acreage in farms from 28,426,650 to 36,214,751, or 27.4 per cent; and the improved land in farms, from 20,455,092 acres to 24,563,178, or 20.1 per cent. The percentage of the total area used for agricultural purposes increased from 63.3 in 1910 to 80.6 in 1920; the percentage of farm land improved decreased from 72 per cent to 67.8. The total value of farm property showed an apparent increase, from $974,814,205 in 1910 to $1,759,742,995 in 1920, or 80.5 per cent; the average value per farm, from $13,109 to $22,651. In interpreting these values, and all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 77,690 farms in 1920, 56,917 were operated by owners, 855 by managers, and 19,918 by tenants. The comparative figures for 1910 were 63,212, 484, and 10,664. White farmers in 1920 numbered 77,147, of whom 40,899 were native, and 36,248 foreign-born. In 1910, there were 73,617 white farmers; 35,750 native, and 37,867 foreign-born. In 1920, the colored farmers numbered 543, of whom 517 were Indians; in 1910, there were 743, of whom 721 were Indians. Farms free from mortgage in 1920 numbered 12,833, compared with 30,651 in 1910; those under mortgage, 40,462, compared with 31,727 in 1910—a reflection of the unfavorable agricultural condition after the War. The number of dairy cows in 1920 was 461,093, compared with 259,173 in 1910, indicating the development of dairy farming. The number of "beef cows" was 296,135, compared with 119,510; and the number of sheep increased from 241,392 to 298,912. The estimated production of the principal farm crops in 1923 was as follows: corn, 21,457,000 bushels; spring wheat, 62,352,000 bushels; oats, 57,950,000 bushels; rye, 10,046,000 bushels; barley, 22,783,000 bushels; potatoes, 12,764,000 bushels; hay, 1,450,000 tons, and flaxseed, 9,259,000 bushels. Comparative figures for 1913 are: corn, 10,800,000 bushels; wheat, 78,855,000; oats, 57,825,000; rye, 1,800,000; barley, 25,500,000; potatoes, 5,100,000; and hay, 388,000 tons.

Manufactures. North Dakota is not a State of great industrial importance. There were three cities in 1920 having more than 10,000 inhabitants. These formed 7.2 per cent of the total population in 1920, and reported 33.3 per cent of the value of the State's manufactured products in 1919. There were in the State 752 manufacturing establishments in 1909; 699 in 1914; and 894 in 1919. Persons engaged in manufacture numbered 4148, 4627, and 6148; and the capital invested amounted to $11,584,747, $14,213,302, and $24,548,833, in those years. The value of the manufactured products amounted to $19,137,506 in 1909; $21,147,431 in 1914; and $57,373,622 in 1919. The large increase in value of products is due largely to the change in industrial conditions brought about by the War, and cannot be properly used to measure the growth of manufactures between the industrial censuses of 1914 and 1919; but the increase in number of wage earners and in number of establishments is clear evidence of growth in the manufacturing activities of the State. The most important industry in point of value of product is flour and gristmilling. This, in 1909, amounted to $11,685,000; in 1914, to $12,030,000; and in 1919, to $29,282,000. The manufacture of butter ranks second in this respect, valued, in 1909, at $1,029,000; in 1914, $1,740,000; and in 1919, $11,122,000. Printing and publishing, ranking third, had a product valued at $1,910,000 in 1909; $2,220,000 in 1914; and $3,225,000 in 1919. Car construction and repair, in fourth place, had a product valued in 1909 at $680,000; in 1914, $1,235,000; and in 1919, $3,183,000. The principal manufacturing cities are Fargo, Grand Forks and Minot.

Education. Education has been one of the chief concerns of the citizens and government of North Dakota from the beginning of its Statehood, and progress in educational matters accelerated during the decade 1914–24. During this period there was a rapid increase in the number of standardized rural schools and in the consolidated schools of the State. Two normal schools were established at Minot and Dickinson, respectively, and the normal school at Valley City became the State Teachers College, granting a bachelor's degree. During the last few years of the decade a campaign against illiteracy was in progress. The legislative session of 1923 granted an appropriation for Americanization work which made it possible for the department to appoint a State director for adult education. The State was entering upon what was practically a period of reconstruction in education, and a new State education programme was being undertaken. The total enrollment in the public schools increased from 139,802 in 1910 to 168,446 in 1920. The total enrollment in the high schools in 1920 was 15,062. Total expenditure for education increased from $4,829,232 in 1910 to $13,306,724 in 1920. The percentage of illiteracy in the State decreased from 3.7 per cent in 1910 to 2.9 per cent in 1920: among the native white population, from 0.4 to 0.3; among the foreign-born white, from 5 to 4.9; and among the negro, from 6.8 to 6.7.

Finance. For finance, see STATE FINANCES.

Political and Other Events. The decade 1914–24 was notable in the political history of the State in that it marked the rise of the Non-Partisan League to a position of control, which brought about practically a Socialist form of government. Elections were held in 1914 for governor and United States Senator. L. B. Hanna, Republican, was elected governor and A. J. Gronna was reëlected Senator. The Non-Partisan League, an organization composed chiefly of farmers, and founded largely through the efforts of A. C. Townley, Socialist, had, by 1916, gained such strength that it was able to control the political situation. The success of

the League was due chiefly to a breach in the Republican party, which divided into factions, and partly to a prolonged newspaper agitation and conditions among the farmers which made the situation ripe for a political overturn. The League advocated the ownership by farmers of terminal elevators, banks and other facilities for marketing their crops. The State-wide primaries in June, 1916, endorsed candidates of this party, and the State Republican organization came under its control. In the elections in November, the League elected its entire State ticket, including L. J. Frazier for governor The League, however, supported Porter J. MacCumber for reëlection to the United States Senate. In the presidential voting of this year, President Wilson received 55,260 votes, and Charles E Hughes, 53,471 votes. The League, having gained full control of all departments of the State government, planned an extensive series of measures, largely along State ownership lines, including the ownership by the State of terminal grain elevators, packing plants, banks, and other organizations. In 1918, Governor Frazier was reëlected, together with the other State officers. At a referendum election held in 1919, the legislative programme of the Non-Partisan League (see *Legislation* below), was adopted. A C Townley, president of the League, was in 1919 found guilty under the State Sedition Law. The Non-Partisan League was continued in political power by the election, in 1920, of Governor Frazier, who was reëlected. The Republican-Non-Partisan candidate for the Senate, E. F. Ladd, was elected, defeating Senator Gronna. As the result of the carrying out of the programme of the Non-Partisan League during this year, the financial system of the State became severely embarrassed The League had established a State bank in which it was designed to compel the deposit of all public funds. This bank was to be the source of credit for carrying out their plans, and at one time it contained over $30,000,000 in deposits The people voted against the compulsory deposit of funds in the bank, and as a result there were withdrawn large amounts until the deposits amounted, in 1920, to only about $10,000,000 In spite of the action of the State Industrial Commission forbidding counties and towns to withdraw funds, the situation became extremely embarrassing and the programme of the League was largely discontinued. A plan to finance industries by the issue of bonds amounting to $17,000,000, failed. In the presidential voting of this year, W. G. Harding received 160,072 votes, and J. M. Cox, 37,422. Industrial and financial conditions continued to be bad in 1921, chiefly as a result of legislation passed in accordance with the programme of the Non-Partisan League The government system of North Dakota provides for the recall of public officials, and by a vote of recall Governor Frazier, the Attorney General, and the Commissioner of Agriculture and Labor, were recalled R. A. Nestos succeeded as governor. This action was a serious reverse to the Non-Partisan League. In the election of 1922, Governor Nestos was reëlected, defeating the Non-Partisan candidate. Lynn J. Frazier, however, was elected to the Senate. The Non-Partisan League also elected a State Auditor and other State officials. At the election of November, 1922, the people adopted a soldiers' bonus measure. This was declared unconstitutional by the State court on Feb. 10, 1923. Governor Nestos was inaugurated on Jan. 3, 1923. In his message he urged the revision of the system of taxation of the State and the curbing of expenditures. At presidential primary elections held early in 1924, President Coolidge received 50,539 votes, Senator La Follette, 37,052 votes, and Senator Johnson, 30,934 votes. William G. McAdoo was the unopposed Democratic nominee

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. In 1915, the Legislature abolished capital punishment In 1917, the Non-Partisan League was in control of the Legislature and a great mass of legislation was introduced along lines advocated by that body. The judicial system of the State was amended. The Torrens system of registration of land titles was put into effect. A constitutional amendment was proposed creating a Hale Insurance Fund for the protection of farmers' crops. A special session of the Legislature was held in 1918. This authorized the county to issue bonds and loan money to farmers on their personal notes. At this session a Federal Prohibition Amendment was ratified. The Legislature of 1919 created an industrial commission and authorized it "to conduct and manage, on behalf of the State, certain utilities, industries, enterprises and business projects." This commission was composed of the Governor, Attorney General and other State officers. The State bank and banking system were also adopted and an issue of $20,000,000 in bonds authorized for the establishment of the system. The Legislature also adopted an inheritance and income tax and created a State Board of Administration. Most of these measures were ratified by the people on June 22, 1919. The Legislature of 1919 also adopted an amendment authorizing the State to engage in any industry not specifically prohibited. In 1923, the Legislature passed a measure prohibiting expenditures of excessive appropriations. It passed measures regulating the use of liquor and increased the penalties for violation. It also enacted a measure forbidding the wearing of masks in public places with the intent to conceal the wearers' identity

NORTH DAKOTA, UNIVERSITY OF. A co-educational State institution at University Station, Grand Forks, N. D., founded in 1883. The student enrollment increased from 740 in 1914 to 1351 in 1923–24 and 445 in the summer of 1923 The faculty was increased during the same period from 80 to 109 members, and the library from 55,000 to 80,000 volumes. A chemistry building and an armory were completed in 1919 and a Law School building was opened in 1923. Frank Le Rond McVey, Ph.D., resigned from the presidency in 1917 and was succeeded by Thomas F. Kane, Ph.D., LL.D.

NORTHERN EPIRUS. See EPIRUS, NORTHERN.

NORTHERN TERRITORY. A territory of the Commonwealth of Australia, situated in the central and northern part of the continent. Area, 523,620 square miles; population, exclusive of aborigines, in 1911, 3310; in 1922, 3554. Occupation proceeded slowly; only 747 square miles had been alienated by 1921. Mineral production steadily declined so that by 1921–22 only £9908 in all was the value of the total yield (£55,299 in 1912). The trade records made a

similar showing: imports and exports for 1913, £20,977 and £67,911; for 1921–22, £12,115 and £5036. Revenues and expenditures over the period were: for 1913–14, £73,657 and £532,535; for 1921–1922, £71,239 and £289,062. Expenditures up to 1921 were heavy because of the Port Augusta Railway project. Up to June 30, 1922, the public debt, a charge on the Commonwealth, was £3,951,746. The policy of the government was to dispose of the lands by leasehold only.

NORTH POLE. See POLAR RESEARCH.

NORTH SCHLESWIG. See SCHLESWIG.

NORTH SHORE MUSIC FESTIVAL. See MUSIC, *Festivals.*

NORTHWEST TERRITORIES. The name of the unorganized territories (Franklin, Keewatin, and Mackenzie) of the Dominion of Canada, with an area of 1,242,224 square miles, and a population in 1911 of 6507 and in 1921 of 7988. Agriculture was carried on to a small extent only, because of the short summer season, but vegetable gardening was successful when tried, e.g. at Fort Resolution, Fort Smith, Fort Vermilion, and the Roman Catholic Mission at Salt Plain. With the discovery of oil at Fort Norman in 1920, interest in the territories quickened. Other minerals were known to exist, although up to 1924 they were little worked. There were lead and zinc ores on the south side of the Great Slave Lake; gold in the Liard and Peel Rivers; and gypsum, salt, and coal, in considerable quantities. The lake fisheries and forest wealth were still inadequately explored; furs made up 40 per cent of the total Canadian output. The government was carried on under the direction of a commissioner assisted by a deputy commissioner and a council of five.

NORTHWESTERN COLLEGE. A coeducational institution at Naperville, Ill, supported by the Evangelical Church but nonsectarian in its requirements; founded in 1861. The student enrollment and the number of members of the faculty increased steadily from 291 students and 29 instructors in 1916 to 502 students and 40 instructors in the year 1923–24. The library was increased from 12,500 volumes to 16,000 volumes in the same period In 1921, the college received an addition of $500,000 to its endowment, and $250,000 for building purposes, from the Forward Movement Campaign of the Evangelical Association, and in 1923 an addition of 41 acres was made to the campus through other gifts. President, Edward Everett Rall, Ph D.

NORTHWESTERN UNIVERSITY. A coeducational university composed of the College of Liberal Arts, College of Engineering, School of Music, School of Speech, School of Commerce, and the Medill School of Journalism, the Graduate School of Arts and Sciences, and the School of Education at Evanston, Ill.; the Dental School, Law School and part-time classes of the School of Commerce and the Medill School of Journalism at 31 West Lake Street, Chicago, and the Medical School at 2421 South Dearborn Street, Chicago. The College of Liberal Arts, the oldest school of the university, was founded in 1851. In 1923–24, the enrollment of the university was estimated at 9925, including the summer session and about 4000 students in the Chicago part-time courses in commerce and journalism. In 1914, the corresponding enrollment was 4138. The faculty in 1923–24, excluding the summer session lecturers, was 590 as contrasted with 450 in 1914. Walter Dill Scott, Ph.D, LL.D., was elected president in 1920 to succeed Lynn Harold Hough, LL.D., resigned.

NORTON, CHARLES DYER (1871–). An American banker, born at Oshkosh, Wis., and educated at Amherst College. For several years he was engaged in magazine and insurance work. In 1909–10 he was assistant secretary of the United States Treasury, and from 1910 to 1911, secretary to President Taft. He was in 1911 elected vice president of the First National Bank of New York City and in 1918 became president of the First Security Company. He was an official in many other corporations and a trustee of the Metropolitan Museum of Art, the American Academy in Rome, the American Federation of Arts, the Russell Sage Foundation, etc.

NORTON, THOMAS HERBERT (1851–). An American consul and chemist (see VOL XVII). From 1915 to 1917 he was detailed by the Department of Commerce to further the development of American chemical industries, especially dyestuffs. From 1917 to 1920 he was chemist with E I. du Pont de Nemours and Co. From 1917 to 1918 he edited *The Chemical Engineer*, and in 1920 he became editor of *The Chemical Color and Oil Daily.* Among his later writings are *Dyestuffs for the American Textile Industry* (1915); *Cottonseed Industry in Foreign Countries* (1915); *The Dyestuff Census* (1916); and *Tanning Materials of Latin America* (1917).

NORWAY. A kingdom in northern Europe with a total area of 124,964 3 square miles. Its population in 1920 was 2,649,775, of which the urban numbered 785,404. Chief cities were: Christiania, 258,483 (1910, 241,834); Bergen, 91,443 (1910, 84,330); Trondhjem, 55,030 (1910, 45,335); and Stavanger, 43,778 (1910, 37,261) The total population in 1910 was 2,391,782, of which 713,262 was urban.

Agriculture. Total area of land under cultivation was 9823 square kilometers, of which 2825 was natural meadow; total forest area, 71,055 square kilometers; unproductive land, 217,643 square kilometers. The following indicates the production of principal crops in metric tons for 1912 and 1923.

Crop	1912	1923
Wheat	8,821	15,975
Rye	24,697	18,847
Barley	73,353	71,456
Oats	198,483	116,112
Mixed grains		11,288
Potatoes	704,240	660,510
Hay	3,129,768	2,015,820

The following compares live stock figures for 1907 and 1918.

	Horses	Cattle	Sheep	Goats	Hogs
1907	170,325	1,027,520	991,211	222,717	163,467
1918	208,219	1,085,707	939,940	185,800	127,230

Foodstuffs for a value of 107,000,000 crowns were imported in 1922. Norway was dependent in large measure on imports of cereals and colonial produce, but, on the other hand, it exported animal and fish products to a large extent.

Industries. There was practically no domestic production of the nonmetallic minerals, but

coal was being mined quite extensively on the Island of Spitzbergen (q.v.) where production at full capacity, it was predicted, would be able to supply the greater part of Norwegian demands. Water power was abundant and was being greatly utilized; the quantity developed up to 1924 was approximately 1,400,000 turbine horse power. The chief mineral products were silver, copper, pyrites, iron ore, and nickel. In 1922, 3015 men were employed in the mining industry, and the total value of production was 20,677,000 crowns; the total output of all minerals was 683,588 metric tons. During 1923, 32 mining establishments employed 3400 workers. There were one silver smelting furnace, two electro steel furnaces, and three ferro-alloy furnaces in Norway during 1923. Norwegian forests and fisheries were the chief natural sources of wealth. The total value of fisheries during 1923 was 65,000,000 crowns The total area covered with forests was estimated at 71,055 square kilometers; value of planed and unplaned, sawn and unsawn timber products exported in 1923 was 73,358,364 crowns.

Transportation. Length of state railways, 2850 kilometers; private railways, 437 Passengers carried by state railways (1921) 24,222,677; private railways, 4,210,885. Volume of freight moved by state railways, 6,396,711 metric tons; by private railways, 609,370 metric tons.

Ocean Shipping. In 1923 vessels entering at Norwegian ports with cargo numbered 5824, with 3,192,407 net tons; in ballast, 2324 with 1,729,201 net tons. Vessels clearing from Norwegian ports with cargo numbered 6254 with 4,097,467 net tons; in ballast, 1966 with 898,441 net tons. The Norwegian merchant marine, on Dec 31, 1923, included the following: sailing vessels, 92; gross tonnage, 126,325; steamers and motorships, 1679; gross tonnage, 2,388,748, including only ships measuring more than 100 gross tons. Gross earnings of merchant marine in 1922 reached 462,600,000 crowns. Norway did an extensive carrying trade all over the world. Its principal ports are Christiania, Bergen, Trondhjem, Narvik, Fredriksstad, and Haugesund.

Foreign Trade. Imports in 1923 were estimated at 1,350,000,000 crowns; exports, at 831,200,000. Of the 1923 exports domestic goods were valued at 791,400,000 crowns; reexports, at 21,000,000; ships sold abroad, at approximately 19,000,000. Exports of Norwegian articles for 1923, grouped according to chief divisions, were as follows:

	Crowns
Live stock	1,097,437
Animal and fish products	170,542,777
Grains	986,825
Seeds and feedstuffs	5,018,510
Fruits, vegetables	336,802
Groceries	961,353
Liquors, alcohol	312,604
Spinning materials	1,917,582
Yarn, thread, and rope	2,461,940
Textiles	2,611,169
Hair, feathers, bone, horn products	23,962,468
Manufactures thereof	226,812
Lumber	70,412,595
Fats, oils, tar, rubber	65,799,176
Manufactures thereof	1,634,651
Finished timber products	2,945,769
Dyes and paints	2,096,795
Wood pulp, paper, etc., of which	269,492,944
Pulp	154,665,872
Carton	5,196,511
Paper	109,430,006
Other vegetable fibres and products thereof	235,977
Minerals, raw and semifinished, of which	81,871,242
Ores	25,359,792
Mineral manufactures, of which:	75,783,221
Fertilizers	39,060,227
Chemical products	21,446,218
Metals, raw and half finished	48,242,505
Metal manufactures	7,218,798
Ships, wagons, machinery [a]	8,460,146
Articles not specifically provided for	1,778,029
Total	791,408,127

[a] Not including ships sold abroad.

The principal countries of origin and destination for 1922 were:

	Imports from	Exports to
	Crowns	Crowns
Great Britain	294,372,200	231,716,418
Germany	283,314,420	76,364,142
Sweden	128,049,340	52,146,693
Denmark	103,920,040	35,819,246
Netherlands	58,594,370	14,272,282
Belgium	36,463,640	24,805,706
France	28,579,200	55,107,155
United States	243,450,290	90,340,474

Imports of the more important articles of consumption for 1923 showed: meat and meat products, 19,000 tons; grain and flour, 495,000; dairy products, 6725; fruits, 46,800; sugar, 58,200; tobacco, 2573; wines and liquors, 880,000 litres in bottles; wines and liquors in barrels, 3990 tons. Exports were: fish, 307,000 tons; canned fish products, 21,388 tons; cod liver oil, 249,748 hectoliters; lumber, 900,626 cubic meters; wood products, 923,700 tons

Finance. The national debt on May 31, 1923, stood at 1,570,000,000 crowns. The gold and silver stocks, on Dec. 31, 1923, totaled 147,300,000 crowns; the amount of paper currency outstanding, 384,800,000 crowns. The exchange, which at par is $.268 to the crown, stood at 6.83 crowns to $1 on Dec. 31, 1923, and at 7.42 crowns on Mar. 18, 1924. Over the period, the cost of living steadily mounted, as revealed by the fact that, on the average for a family of five persons with an income of 1500 crowns per annum in 1914 as 100, the index stood at 283 in December, 1921. On Feb. 15, 1924, it was 234.

History. Norway during the War showed the unsettled condition prevalent in all neutral countries. Norwegians were naturally averse to all participation in the conflict. And yet, because of the many ties that bound the whole western world together, economically, socially, and intellectually, it was inevitable that Norway should feel the weight of war profoundly. The policy of the Scandinavian countries gravitated toward the same end. By the end of August, 1914, the three countries had declared their neutrality; on December 19, agreements were definitely made by which all three pledged themselves to common action in the observance of this neutrality. Throughout the War these conferences continued, with the result that the northern peoples were more firmly drawn together than ever before. The amity with which events were discussed made a pleasant picture against the dark background of the turbulent

nationalistic aspirations of the rest of the European peoples. In fact, the movement thus started for the closer union of the Scandinavian populations soon reached an articulate form in the creation of the Norden Society in 1919. A Norwegian branch was opened on Apr. 12, 1919, an active publicity campaign was kept up, and year books were published. During the War extraordinary measures were necessary to shelter Norway's population as far as possible from the rigors of the hostilities. In November, 1914, a loan of $4,000,000 was voted to cover extraordinary military expenses, and the government tried to push the construction of the two warships then on the ways in English shipyards. A commission was created to regulate the importation and distribution of foodstuffs, and the fixing of prices was likewise established. Because of the setting up of the British blockade in 1914 and the restriction of shipping to a circumscribed area about Scandinavia, Norway's contact with the outside world, on which it depended so much for the continuance of its daily activities, was greatly hampered, and widespread distress ensued. Shipping suffered severely. In all, as a result of torpedoing and mines, 830 ships with a tonnage of 1,238,300 were lost, and about 2000 sailors were drowned. Yet in spite of difficulties that continuously increased, Norwegian sailors refused to be driven from the high seas and maintained their intercourse with countries at war, Great Britain in particular. As foodstuffs became scarce, prices naturally rose and labor unrest increased. In 1916, demonstrations and strikes for the increase of wages involved almost 150,000 workmen, with the result that the Storthing forced through a measure for compulsory arbitration. After the War, the return to regular conditions was slow. Norwegian workmen manifested a great interest in communist doctrines, and in 1919 and 1920 strikes, particularly on the railways, were frequent. Labor circles regarded sympathetically the attempts of Soviet Russia to open commercial relations in September, 1920, but the Norwegian government at first refused to take the step. In 1921 a commercial treaty was effected which granted Russia surprisingly liberal terms, and in March, 1924, *de jure* recognition was accorded. The Norwegian government even refused to press the claims of its nationals in Russia, which amounted to some 300,000,000 crowns. Other matters of national interest after the War were the appointment of a royal commission in 1920, after much agitation, for the consideration of the creation of industrial works councils; the passage by the Storthing in 1921 of a measure tantamount to limited prohibition, which forbade the importation of liquors having more than a 14 per cent alcohol content (in 1924 there was talk of repealing this measure); and the passage of a ship subsidy measure in 1922 which set aside 25,000,000 crowns for government aid. In 1922, the permanent Court of Arbitration at The Hague awarded $12,000,000 to Norway against the United States for the seizure of Norwegian ships in America's ports during the War. For Norway's claims to Spitzbergen, see SPITZBERGEN. Another international dispute which appeared well on the road to settlement, during the period, was the controversy with Denmark over the sovereignty of Greenland. In 1924 a convention was laid before the Norwegian Storthing and the Danish Rigsdag; it provided for an amicable understanding on important economic matters. See also BEAR ISLAND; JAN MAYEN; NAVIES OF THE WORLD.

NORWEGIAN LITERATURE. See SCANDINAVIAN LITERATURE.

NOTRE DAME, UNIVERSITY OF. A Roman Catholic institution for men, at Notre Dame, Ind., founded in 1842. The university increased its student enrollment from 1077 in 1913 to 1900 in the year 1923–24, and 738 in the summer of 1923; its faculty, during the same period, from 84 to 130, and its library from 65,000 to 105,000 volumes. A library was built in 1916, a chemistry laboratory in 1917, a Law College building in 1918, and two halls for freshmen and sophomores, in 1923. Gifts amounting to $645,000 were received in 1921. Rev. John Cavanaugh, C.S.C., was president until 1919, Rev. James A. Burns, C.S.C., Ph.D., 1919–22, Rev. Matthew J. Walsh, C.S.C., Ph.D., 1922– .

NOURISHMENT. See FOOD AND NUTRITION.

NOVÄES, GUIOMAR (1895–). A Brazilian pianist, born at Joao de Boa Vista. At the age of four she began to play by ear, and it was not until she was seven that she received regular lessons from Chiafarelli in São Paulo. Her progress was so rapid that after only two years of instruction she was exhibited as an infant prodigy, making frequent appearances, but at the same time continuing to work systematically. In 1909 she won a scholarship at the Paris Conservatoire, where she remained two years under I. Philipp and graduated as winner of the first prize. After her highly successful début in Paris (1911), she made tours of France, Germany, England, Italy, and Switzerland until 1913. During the next two years she concertized in Brazil and then appeared for the first time in the United States (New York, Nov. 11, 1915), where she won instantaneous and emphatic success. She later made several American tours. She married Ottavio Pinto in 1922.

NOVA SCOTIA. A Canadian maritime province with an area of 21,428 square miles. The population in 1911 was 492,338; in 1921, 523,837, which represented a gain of 6.4 per cent. Of the population in 1921, 56.7 per cent was rural as compared with 62.2 per cent in 1911. The leading cities, with their populations in 1921, were: Halifax, 58,372 (46,619 in 1911); Sydney, 22,545 (17,723 in 1911); Glace Bay, 17,007; Dartmouth, 7899; Amherst, 9998; New Glasgow, 8074; Sydney Mines, 8327; Truro, 7562. Cape Breton Island is an integral part of the province.

Industry. Agriculture remained the leading activity. The geographical situation of the province favored, as always, the cultivation of hay, and in 1923, 890,200 tons were cut. Other important crops were potatoes, oats, and wheat. The production of apples steadily increased so that by 1922 the yield was valued at $7,851,185, against the 1913 crop of $2,000,000; the 1922 crop was 1,891,852 barrels; the 1923 crop, 1,500,000 barrels. The growth of fodder crops and the presence of an important live stock industry made dairying particularly important. Butter production increased tenfold over the period 1911–21. The value of live stock products was put at $2,080,000 in 1923; wool was important. Agricultural products, in all, yielded $40,613,000 in 1923. Lumbering continued to be important. Forest products totaled $11,-

180,000 in 1922. Fisheries continued to absorb the attention of a considerable part of the population. Cod, lobsters, haddock, and mackerel comprised 83 per cent of the 1922 catch, with a total value of $10,207,444, as against $7,384,055 in 1913. In this 19,495 men were engaged, and the whole industry represented a capital of $8,760,000; 4380 men worked in the canneries, which had a total capitalization of $3,801,700. Bituminous coal was far and away the most important mineral. The output in 1922 was 5,569,072 tons, valued at $24,629,921, and was distributed largely among the other maritime provinces. Gold continued to decline; the 1922 yield was only $21,540 as against $44,935 in 1913. Pig iron also showed decreases for the years following 1913. In all, in 1922, Nova Scotia's mineral products were valued at $25,923,499, almost 19 per cent of the total production; Ontario and British Columbia surpassed Nova Scotia. Of the 20 blast furnaces in Canada, 6 were located in Cape Breton and 2 in Nova Scotia. In 1921 there were 2196 industrial establishments (1480 in 1910) employing 17,206 workers and capitalized at $107,490,242 ($79,596,341 in 1910). The cost of materials was $43,919,126 and the gross value of products $84,215,822 ($52,706,184 in 1910). The following industries were important: manufacture of coke, iron and still products ($11,000,000 in 1922), shipbuilding, sugar refineries, boot and shoe works, etc.

Trade and Communications. Imports entered for consumption in 1922–23 were $23,878,615 ($20,753,369 in 1912–13); exports were $46,290,133 ($24,201,473 in 1912–13) In 1922 there were 1451 miles of railway as compared with 1360 in 1913. Some 18,000 miles of highways kept in good repair made intraprovincial communication easy This was further facilitated by the numerous subsidized boats which plied along the shore

Government. The suffrage was exercised by both sexes. Revenues in 1914 were $1,885,000; in 1922, $4,791,000. The Dominion subsidy continued to yield about $636,000. Other sources were royalties on coal lands and other provincial properties, succession duties, etc There was no direct taxation. Expenditures in 1913 and 1922 were $2,098,893 and $4,791,998. In the same period the debt grew from $12,615,686 to $22,616,000. For the year 1921–22, 114,229 pupils were enrolled at 2982 schools. Total cost of education was $3,646,570 as compared with $1,439,742 in 1913. The Province maintained a normal school and an agricultural school at Truro as well as the technical school at Halifax. The most important educational question of the period was the proposal to unite the six most important universities in the Maritime Provinces into a single centre. Representation in Parliament: House of Commons, 16; Senate, 10.

NOYES FOUNDATION, La Verne. See Education in the United States.

NURSERY SCHOOLS. See Education in the United States

NUTRITION. See Food and Nutrition.

NUTS. See Horticulture

NYASALAND PROTECTORATE. A British protectorate in southeastern Africa on the southern and western shores of Lake Nyasa. Area, 39,573 square miles; population (1921), 1,199,934 natives; 1486 Europeans; 563 Asiatics. In 1911 there were 766 Europeans and 481 Asiatics. The chief settlement, Blantyre in the Shire Highlands, had some 300 Europeans. In the Shire Highlands coffee was being cultivated, as well as tobacco, cotton, and tea. The crops showing the greatest advances over the period 1910–22 were tobacco and tea, while cotton and coffee fell behind. Tobacco exports in 1912–13 totaled 2,262,545 pounds; 1922, 6,330,808. Leading imports were cotton piece goods, rice and grain, sugar, and petroleum. Imports in 1913–14 were £208,711; 1921, £637,567; 1922, £522,119 Exports in 1913–14 were £266,089; 1921, £416,404; 1922, £442,164. The trade does not include specie or goods in transit Of the exports, 99 per cent went to the United Kingdom; 55 per cent of the imports came from the United Kingdom and 20 per cent from British possessions. The following figures show the course of administrative charges· revenues for 1913–14 and for 1922, £124,849 and £259,117; expenditures for same years, £133,106 and £305,495. The large deficit in the later year was occasioned by the cost of famine relief measures. The public debt of the protectorate in 1922 was £306,328. To this must be added £3,000,000 borrowed from Great Britain to finance war campaigns in German East Africa. To bring the protectorate into ready communication with the Indian Ocean a railway from Chindio in Portuguese East Africa to Blantyre (174 miles) was constructed. In 1922 another line connecting Blantyre with Beira in Portuguese East Africa was opened. The extension of the railway system northward to Lake Nyasa, on which so much depended, was still only contemplated in 1923. The settlers were involved in the War because of the proximity of German East Africa. Most of the Europeans saw service as well as almost 200,000 natives in the rôle of carriers The natives continued orderly except for a single uprising in 1915 which was speedily quelled.

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OAKLAND. The third city of California. The population increased 44 per cent in 10 years, from 150,174 in 1910 to 216,261 in 1920 and to 240,086 by estimate of the Bureau of the Census for 1923. A $5,000,000 bond issue was authorized by the voters in 1919 to be used in building three high schools and six junior high schools Oakland joined with several neighboring cities in 1923 to purchase the East Bay Water Company and develop new sources of supply for the district. In the same year the city purchased a site on the shore of Lake Merritt on which to build a museum. Plans were under way in 1924 for spending $8,000,000 in developing the water front. Building permits increased 396 per cent from $5,817,905 in 1918 to $27,500,000 in 1923, bank clearings 110 per cent, from $335,334,421 to $803,797,523, and the assessed valuation of the city 28 per cent, from $150,000,000 to $192,221 000.

OATS. Among the cereal crops in the United States oats is exceeded only by corn and wheat in acreage and value. The average annual production for the years 1914 to 1923, inclusive, was 1,334,675,000 bushels and, similarly, the annual production for the three leading States was 206,240,000 bushels for Iowa, 159,445,000 bushels for Illinois, and 119,212,000 bushels for Minnesota. During the World War there was a general increase in acreage and production in the United States, while in Europe the crop decreased and for a number of years did not regain its normal status The United States Grain Standards Act required oats in inter-State commerce to be inspected by a licensed inspector and graded by him on the basis of official standards. According to these standards, effective since June 16, 1919, oats are classified for commercial purposes as white (including yellow), red, gray, and black oats. Each class is divided into four grades on the basis of condition and general appearance, test weight per bushel, sound oats, heat damage, wild oats, and mixtures of other classes of oats. In addition, there is a "sample grade" for oats too poor to come within the numerical grades. For the three years ending June 30, 1922, about 53 per cent of all classes fell into grade three and about 28 per cent into grade two. Consult *United States Department of Agrioulture Year Book*, 1922.

OBER, MARGARETE (1885–). A German dramatic mezzo-soprano, born in Berlin. She studied there with Benno Stolzenberg and, later, Arthur Arndt, whom she married in 1910. After her début at Frankfort in 1906, as Azucena, she was engaged at the Stadttheater in Stettin, where her extraordinary voice and superior talent as an actress attracted the attention of Von Hülsen, who in 1907 engaged her for the Royal Opera in Berlin. Her American début as Ortrud at the Metropolitan Opera House (Nov. 21, 1913) was one of the sensations of the season. From 1913 to 1917 she divided her time between New York in the winter and Berlin in the summer and sang as guest in other principal German opera houses and in Amsterdam When the Royal Opera became the Staatsoper in 1919, she was retained as one of the principal stars. Her interpretation of the great Wagner rôles and of the German Lieder is considered unexcelled.

OBERLIN COLLEGE. A nonsectarian, coeducational institution at Oberlin, Ohio, founded in 1833. There was only a slight variation in the enrollment of students during the decade 1914–24, since the college limited the attendance of students to the number that it could efficiently care for with its classrooms, laboratories, and dormitories. In 1922–23, the total enrollment was 1801. The faculty increased from 157 in 1913–14 to 185 in 1923–24 The library, which was said to be the largest college library in Ohio, numbered 241,000 bound volumes and 178,000 pamphlets New buildings erected during the 10 years included an art building in memory of Dr. Dudley P. Allen, given by Mrs. Allen, and an administration building erected in memory of Gen Jacob Dolson Cox. In November 1923, Oberlin entered upon a campaign for $4,500,000 for new endowment and buildings. By Jan 1, 1924, gifts and pledges were received for $3,000,000, and it was expected that the remainder of the fund would be secured before the end of 1924 The largest contribution was the gift of $500,000 by the General Education Board. Work was to begin in the spring of 1924 on a new college hospital. President, Henry Churchill King.

OBREGÓN, ALVARO (1880–). A president of Mexico, born in the District of Alamos For many years he was engaged in scientific farming and stock-raising on his large estates. He was an advocate of economic reforms, including the better education of Indians In 1912 he began his military career by recruiting a force of Indians to assist President Madero. He manifested unusual military talent in this brief campaign. He was appointed colonel of the Sonora state militia, and after Diaz's military revolt in Mexico City he offered his force to the government of Sonora and was sent to Nogales, where he routed the garrison. Following a victory at Cananea he was made general of the division by Governor Carranza of Coahuila. After many victories, he captured Guadalajara on July 9, 1914, and entered Mexico City as a victor in the following August. In 1915 Obregon defeated Zapata in Pueblo and again occupied Mexico City. His most important victory was over Villa in Celaya, in April. In this battle he lost an arm. In 1920 he entered a successful revolt against Carranza and in the same year was elected president of the republic. For his negotiations with the United States in 1923–24 and for other events of his administration in Mexico, see MEXICO.

O'BRIEN, EDWARD JOSEPH HARRINGTON (1890–). An American author and editor, born at Boston, Mass. He studied at Boston College and at Harvard and from 1912 to 1915 was editor of *The Poetry Journal.* In the year following he was editor of *Poet Lore.* He wrote *The Flowing of the Tide,* a play (1910); *White Fountains,* verse (1917); *The Bloody Fool* (1917); *Distant Music* (1921); and *Hard Sayings* (1922). He edited *The World's History at a Glance* (1913); *Poems of the Irish Revolutionary Brotherhood* (1917); and from 1915 edited annually *The Best Short Stories* and *The Best English Stories.* He also translated several books from the French and other languages.

O'BRIEN, FREDERICK (1869–). An American writer, born in Baltimore, Md., and educated at the Jesuit College in Baltimore and the University of Maryland. At the age of 18 he went to sea and for many years thereafter traveled extensively. He was at various times connected with newspapers in New York, San Francisco, Manila, and Paris. During the War he was acting food administrator of California and chief of education As a result of a sojourn in the islands of the South Seas, he wrote *White Shadows in the South Seas* (1919) This was immensely successful and was followed by *Mystic Isles of the South Seas* (1921) and *Atolls of the Sun* (1922)

OBSTETRICS. See ABORTION.

OCCIDENTAL COLLEGE. An institution at Los Angeles, Cal., founded in 1887 under Presbyterian auspices. The number of students increased from 311 in 1915 to 522 in 1923, the faculty from 25 to 47 members, the endowment from $161,027 to $363,722, and the annual income from $49,782 to $129,961. The Graduate School and the School of Education were founded in 1922. The women's gymnasium and the president's house were built in 1922; the library, an anonymous gift in memory of Mrs. Mary Norton Clapp, was completed in March, 1924, at a cost of $150,000; plans were in preparation for the building of Orr Court, a women's building and residence court, the gift of William Mead Orr in memory of Bertha Harton Orr A campaign for $500,000 was completed in 1924, oversubscribed by $150,000. President, Remsen D. Bird, D.D.

OCEAN NAVIGATION. See SHIPPING; SHIPBUILDING; NAVIGATION.

OCEANOGRAPHY. See EXPLORATION.

OCHSNER, ALBERT JOHN (1858–1925). (see VOL. XVII). In 1916 he wrote the surgical section of Smithies's *Cancer of the Stomach,* and in 1917, assisted by Percy, he brought out a new edition of his work, *A New Clinical Surgery,* with the title *A New Manual of Surgery, Clinical and Military.* A large four-volume system of surgery edited by Ochsner, *Surgical Diagnosis and Treatment by American Authors,* was published in 1920. During the War he was a major of the Medical Reserve Corps

O'CONNOR, ANDREW (1874–). An American sculptor (see VOL. XVII). His recent important works include a fine "Soldier" Worcester, Mass.; "Serenity," part of the monument to General Thomas, Tarrytown, N. Y.; "Inspiration," St. Louis Museum, and especially a bronze Lincoln (Springfield, Ill.), which has caused much discussion.

OFFICERS' TRAINING CAMPS. See ARMIES AND ARMY ORGANIZATION.

OGG, FREDERIC AUSTIN (1878–). An American educator, born at Solsberry, Ind., and educated at DePauw, Harvard, and Indiana Universities. From 1905 to 1913 he was a member of the faculty of the Boston University and Simmons College. In the latter year he was appointed associate professor at the University of Wisconsin, where from 1917 he was professor of political science. He wrote *The Opening of the Mississippi—A Struggle for Supremacy in the American Interior* (1904); *Social Progress in Contemporary Europe* (1912); *Life of Daniel Webster* (1914); *Economic Development of Modern Europe* (1917); *The Old Northwest and Reign of Andrew Jackson* (in *Chronicles of America,* vols. xix and xx; 1919); *National Governments and the World War,* with C. A. Beard (1919); and *Introduction to American Government,* with P. O. Ray (1921) He was editor of *The Century Political Science Series*

O'HIGGINS, HARVEY J. (1876–). An American writer, born in London, Ont., and educated at the University of Toronto. He began his career as a writer by the publication of *The Smoke Eaters* (1905). This was followed by *A Grand Army Man* (1908); *The Beast and the Jungle,* with Judge Ben B. Lindsey (1910); *Polygamy* (1914); *From the Life* (1919); *The Doughboy's Religion,* with Judge Lindsey (1919); *Secret Springs* (1920); *Some Distinguished Americans* (1922); and *The American Mind in Action* (1924) He also wrote several plays with Harriet Ford. Some of these were successfully produced.

OHIO. Ohio is the thirty-fifth State in size (41,040 square miles) and the fourth in population; capital, Columbus. The population increased from 4,767,121 in 1910 to 5,759,394 in 1920, a gain of 20.8 per cent. The white population increased from 4,654,897 to 5,571,893; negro, from 111,452 to 186 187; native white, from 4,057,652 to 4,893,196; and foreign-born white, from 597,245 to 678,697. The urban population rose during the decade from 2,665,143 to 3,677,136; the rural population, on the other hand, fell from 2,101,978 to 2,082,258. The growth of the principal cities was as follows: Cleveland, from 560,663 in 1910 to 796,841 in 1920; Cincinnati, 363,591 to 401,247; Toledo, 168,497 to 243,164; Columbus, 181,511 to 237,-031; Akron, 69,061 to 208,435 (see articles on these cities)

Agriculture. As Ohio is an important grain-growing State, agricultural conditions in the decade 1910–20 were affected by the fluctuations in production and prices of grain during the War and post-war period. The general agricultural history of the period is treated under AGRICULTURE, CORN, BARLEY, WHEAT, etc. Agriculture in most of its phases showed a decline in the State during the decade. While the population increased 20 8 per cent, from 1910 to 1920, the rural population decreased from 51.9 per cent in 1900 and 44.1 per cent in 1915 to 36.2 per cent in 1920. The number of farms decreased 5 6 per cent (from 270,045 in 1910 to 256,695 in 1920); the acreage of land in farms, from 24,105,708 to 23,515,888, or 2.4 per cent, and the improved land in farms, from 19,277,969 acres to 18,542,353, or 3.6 per cent. The percentage of total area in farms decreased from 92.5 in 1910 to 90.2 in 1920; the percentage of land improved from 73.7 to 71.1. Farm land value increased in the decade largely as a result of war prices for farm products. The total

value of farm property rose from $1,902,694,589 in 1910 to $3,095,666,336 in 1920 or 62.7 per cent; the average value per farm from $6994 to $12,060. In interpreting these values and all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920 Of the total of 256,695 farms in 1920, 177,986 were operated by owners, 3065 by managers, and 75,644 by tenants The comparative figures for 1910 were 192,104, 2753, and 77,188 White farmers in 1920 numbered 255,079; colored farmers, 1616 In 1910, white farmers numbered 270,095, and colored farmers, 1950 Farms free from mortgage in 1920 numbered 110,004; those under mortgage, 50,784 In 1910, farms free from mortgage numbered 135,616, those under mortgage, 54,997 The total number of cattle in 1920 was 1,926,823, of which 1,349,373 were dairy cattle. In 1910 the cattle numbered 1,837,607 (dairy cattle, 905,125) Sheep in 1920 numbered 2,102,550, compared with 3,909,162 in 1910; hogs, 3,083,846, compared with 3,105,627. The estimated production of the principal farm crops in 1923 was as follows: corn, 177,794,000 bushels; spring wheat, 465,000 bushels, winter wheat, 42,588,000 bushels; oats, 55,078,000 bushels; rye, 1,302,000 bushels; barley, 2,076,000 bushels; potatoes, 11,533,000 bushels; sweet potatoes, 335,000 bushels; hay, 3,557,000 tons; tobacco, 42,770,000 pounds; and sugar beets, 385,000 short tons Comparative figures for 1913 are: corn, 146,250,000 bushels; wheat, 35,100,000; oats, 54,360,000; rye, 1,600,000; barley, 960,000; potatoes, 10,240,000; hay, 3,848,000 tons; and tobacco, 61,425,000 pounds

Mining. Ohio is one of the most important of the mineral-producing States. In point of value of products, it ranked sixth in 1921. Its chief products are coal, clay products, petroleum, and natural gas. The table gives figures on

MINERAL PRODUCTS IN OHIO

Year	Coal		Clay products	Petroleum	
	Net tons	Valued at	Valued at	Barrels	Valued at
1914	18,843 115	$21 250,642	$37,166 768	8,536,352	$13 372,729
1915	22,434,691	24,207,075		7,825,326	10,061 493
1916	34,728,219	46,150,907	44,947,877	7,744,511	16,154,940
1917	40,748,734	100,897,148		7,750,540	21,101,483
1918	45,812,943	118 095 548	52 899 180	7,285,005	23,465,197
1920	45,878,191	175 081,000	82,061,960	7,400,000	37,338,000
1921	31,942,776	84,686,500	67,396,680	7,335,000	21,512,000
1922	26,953,791			6,781,000	

facturing establishments in 1909; 15,658 in 1914; and 16,125 in 1919. Persons engaged in manufacture numbered 523,004, 606,807, and 882,918; and the capital invested amounted to $1,300,732,732, $1,677,551,663, and $3,748,743,996 in those years. The value of products was $1,437,935,817 in 1909; $1,782,808,279 in 1914; and $5,100,308,728 in 1919. The large increase in value of products was due largely to changes in industrial conditions brought about by the War, and cannot be properly used to measure the growth of manufactures during the census period 1915–19, but the increase in number of establishments and in number of wage earners clearly indicates decided growth in the manufacturing activities of the State. The most important industry in point of value of product is iron and steel, in 1909 amounting to $197,780,000; 1914, $205,023,000; and in 1919, $626,370,000. Foundry and machine-shop products rank second in point of value: in 1909, $145,837,000; in 1914, $178,855,000, and in 1919, $572,079,000 In third place is the manufacture of rubber tires and rubber goods, in 1909 valued at $53,911,000; in 1914, $109,659,000; and in 1919, $551,118,000. The manufacture of automobiles, bodies and parts, ranking fourth, had a product valued at $38,839,000 in 1909; $85,711,000 in 1914, and $379,436,000 in 1919. The principal manufacturing cities of the State are Cleveland, Akron, Cincinnati, and Toledo. In Cleveland, there were 2148 manufacturing establishments in 1909, with a product valued at $271,961,000, 2345 in 1914, with $352,418,000; and 2946 in 1919, with $1,091,577,000. In Cincinnati, there were 2183 in 1909, with $192,516,000; 2135 in 1914, with $210,860,000; and 2239 in 1919, with $500,041,000 Akron had 246 manufacturing establishments in 1909, with a product of $73,158,000; 305 in 1914, with $122,292,000; and 304 in 1919, with $558,962,000. Similar figures for Toledo were: 760 in 1909, with $61,230,000; 713 in 1914, with $115,049,000; and 671 in 1919, with $293,521,000 Other important manufacturing cities are Columbus, Dayton, Canton, Springfield, and Youngstown.

the first three. The diminished output of coal in the latter two years was due largely to the long strike that occurred in 1921 and affected the entire mid-Western field. In addition to these three minerals, the State produces large quantities of natural gas, natural-gas gasoline, sand and gravel, and stone The total value of the mineral products in 1921 was $223,533,658, compared with $355,844,499 in 1920; $214,829,888 in 1919; $246,162,215 in 1918; and $101,661,384 in 1914.

Manufactures. Ohio is one of the most important States industrially In 1920, there were 50 cities having more than 10,000 inhabitants, and forming 54.5 per cent of the total population of the State. These cities, in 1919, reported 79 6 per cent of the State's manufactured products. There were in the State 15,138 manu-

Education. The greatest advancements in education in Ohio after 1913 were county school systems and trained teachers. There was no supervision of rural schools until 1914, when county boards of education were established These boards elect county superintendents of schools and, if necessary, assistants. Hundreds of centralized rural schools of the best type have been built under the new régime, most of which include high schools. No training was required of teachers prior to 1914, except by certain city boards of education The requirements were increased gradually; until the standard rose in 1921 to a full year of normal work, which is, in effect, a year beyond a four-year high school course. Two new State normal

schools were started in 1913; and a county normal school plan was adopted to supplement the other agencies for preparing elementary teachers. There are over 50 of these schools with work of strictly collegiate grade. Some of the private colleges, of which there are many in Ohio, also undertook to train elementary teachers, under the supervision of the State Department of Education. In 1924, all but two of the standard colleges prepared high school teachers with the large amount of professional training required by the 1914 law. High school supervision by the State university was merged with that of the State Department of Education. Most high schools rose to first grade rank. The compulsory education law of 1921 requires attendance to the age of 18 of those not through high school; those fitted may secure work certificates at 16. Other advances are: much improvement in day schools for blind, deaf and crippled; State and many county supervisors of music; moving picture censorship under State director of education; increase of director's salary from $4000 to $6500; establishment of Smith-Hughes vocational work, especially strong in part-time industrial education; a model teachers' retirement law; increase of State aid to weak school districts from about $200,000 to $2,400,000 with the administration entirely under the State director of education. The enrollment increased from 895,167 in 1914 to 1,180,641 in 1923. The average attendance increased from 720,442 in 1914 to 1,004,235 in 1923 Illiteracy in the State decreased from 4 per cent in 1910 to 3.6 in 1920; in the native white population, from 2.2 per cent to 1.2 per cent; among the foreign-born white, rose from 11.8 per cent to 13 4 per cent; and among the Negroes, fell from 13.9 per cent to 9.7 per cent.

Finance. For finance, see STATE FINANCES.

Political and Other Events. There were many important political events in the history of Ohio in the decade 1914–24. For the greater part of the period the Republican party remained in control, but during a portion of the time, the Democrats developed sufficient strength to elect candidates for office and to control the Legislature. Elections were held in 1914 for State officers and United States Senator. Warren G. Harding, former lieutenant-governor, was nominated by the Republicans for the Senatorship, and Timothy S. Hogan by the Democrats. For governor, the Republicans nominated Frank B. Willis and the Democrats James M Cox. Willis was elected governor, and Harding, Senator. While the Republicans carried practically the entire State ticket, an amendment establishing county local option was carried in this election, while amendments providing for woman suffrage and prohibition were defeated. In April of this year the coal mines of the State were shut down as the result of the failure to negotiate an agreement as to payment between employers and employees. The strike continued during the year, involving great suffering to the miners and huge losses to the industry. In 1915 a constitutional amendment forbidding the sale of intoxicating liquors was submitted to the people and was rejected. Severe floods in the State, in July of this year, resulted in the death of five and damage of more than $2,000,000,000. In 1916 the Republicans renominated Governor Willis, while the Democratic nominee was James M. Cox. The Democrats renominated Senator Pomerene; the Republicans, Myron T. Herrick. The entire State Democratic ticket was elected, and Senator Pomerene was reëlected. In the presidential voting of this year, President Wilson received 604,161 votes; Charles E. Hughes, 514,753. During this year there were serious labor troubles in the State, and riots in East Youngstown among the steel workers resulted in great damage to property and the destruction of practically the entire business section by fire. In 1917 the people defeated a law permitting women to vote for presidential electors. In the same election a prohibition amendment was rejected. Governor Cox was renominated by the Democrats in 1918 and was reëlected. A State-wide prohibition amendment was adopted at this election. The Republicans were again successful in the State campaign in 1920, electing their candidate for governor, Harry L. Davis, while Frank L. Willis was elected to the Senate. In this year both candidates for President were natives of Ohio. In the presidential vote, Warren G. Harding received 1,182,022 votes; James M Cox, 780,037. In 1921, at a special election, the people of the State ratified a soldiers' bonus of $25,000,000. In 1922 the Republicans nominated for governor Carmi A. Thompson, while the Democratic nominee was A. V. Donahey. For United States Senator the Republican candidate was Simeon D. Fess, member of Congress. The Democrats renominated Senator Pomerene. Donahey was elected governor, and Fess, Senator. At this election the constitutional amendment providing for the sale of beer and light wines was proposed for submission. The Secretary of State refused to certify the amendment for a vote on the ground that even if adopted, it would be without effect. The Supreme Court ordered him to place the proposal on the ballot. It was rejected by the people by a majority of over 180,000 votes. In 1923 the people rejected, on November 6, an old-age pension proposal and approved an amendment relieving employers from liability in private suits where covered by the State workmen's compensation insurance. On June 28, 1924, the city of Lorain and others west of it were swept by a tornado which did damage of more than $50,000,000 and took 94 lives, 71 of them in Lorain. Most of the business district of Lorain was devastated.

Legislation. Among the important acts of the Legislature in the decade 1914–24 were the following. Two special sessions were held in 1914. An act was passed reorganizing the agricultural interests of the State and creating an agricultural commission. The common school system was also reorganized. In 1917 the Legislature was under Democratic control. A law was passed permitting women to vote for president. This, as noted above, was defeated by the people. The Federal prohibition amendment was ratified by the Legislature on Jan. 7, 1917, but on November 4 of that year, the amendment was rejected by the people by a majority of 542. On Jan. 6, 1919, the Legislature ratified the Federal woman suffrage amendment. At this session of the Legislature, statutes were passed defining and punishing criminal syndicalism and sabotage. The teaching of German in the elementary grades of public and parochial schools was forbidden. A new State highway act was passed. The Legislature of 1921 amended the compulsory education laws; made provision for coöperative marketing; passed

measures for the enforcement of the prohibition law, and amended the laws relating to the finances of the State. The Legislature in 1923 created a judicial council of nine judges and passed an old-age pension proposal, which was on Nov. 6, 1923, rejected by the people.

OHIO STATE UNIVERSITY. A coeducational institution at Columbus, Ohio, founded in 1870 and supported by appropriations from the State and Federal governments. The enrollment of the university more than doubled between 1914 and 1923–24, increasing from 4466 in the former year to 9875 in the latter. In the same period the faculty increased from 423 to 718 members, the library from 138,101 to 238,154 volumes, and the income from $1,276,134 to $4,499,577 68. The campus and university farm covered 880 acres. The university consisted in 1924 of 10 colleges and the Graduate School. In 1914, the Sterling Ohio Medical College, including the dental school, was incorporated as part of the university. The College of Commerce and Journalism was added in 1916. In 1922 and 1923–24, many new buildings were erected, including Mack Hall, a new residence hall for women; Pomerene Hall, a women's gymnasium; the Ohio Stadium; the new administration building; the new commerce building; the new journalism building; new chemistry laboratories; Hamilton Hall, the new medical science building; and an art studio New structures also were erected for beef cattle, dairy cattle, hogs and sheep. About $200,000 was expended on enlarging the power plant. Contracts were to be let in 1923–24 for a new university hospital and addition to medical science building to cost more than $750,000. The sum of $50,000 was appropriated for a residence for the president of the university, to be erected on the campus. During this period the university began to operate on the four-quarter system, abandoning the semester plan. The quarters were 12 weeks in length. The schedule was so arranged that a student might enter at the beginning of any quarter. Gifts to the university included $17,000 from Charles Cutler Sharp for the establishment of the Sharp Library Fund for purchase of books for the department of chemistry. President, W. O. Thompson, D.D., LL.D.

OHIO WESLEYAN UNIVERSITY. A coeducational institution at Delaware, Ohio, founded in 1844. The student enrollment increased from 1126 in 1914 to 1797 in 1923–24, the faculty was increased in membership from 66 to 126, and the library from 66,210 to 95,061 volumes. During the decade, departments of education, home economics, business administration, and religious education were founded. Austin Hall was built and the new Perkins observatory was begun. The Z. T. White building, in the heart of Columbus, valued at approximately $1,000,000, was bequeathed to the university by Mr. White in 1922, and $250,000 was given for the purchase and maintenance of a 61-inch reflecting telescope In the same year, the university began a campaign to raise $8,000,000 to add to the endowment and provide funds for 16 new buildings. John Washington Hoffman, D.D., LL.D., succeeded Herbert Welch, D.D., as president in 1916.

OIL. See PETROLEUM.

OIL ENGINE. See INTERNAL-COMBUSTION ENGINES.

OIL SCANDALS. See UNITED STATES, *History.*

OISE, BATTLES OF THE. See WAR IN EUROPE, *Western Front.*

OKLAHOMA. Oklahoma is the seventeenth State in size (70,057 square miles) and the twenty-first in population; capital, Oklahoma City. The population increased from 1,657,155 in 1910 to 2,028,283 in 1920, a gain of 22.4 per cent. The white population increased from 1,444,531 to 1,821,194; the Negro, from 137,612 to 149,408; and the native white, from 1,404,447 to 1,781,226. The Indian population decreased from 74,825 to 57,337; and from 40,084 to 39,968. Both the urban and rural populations increased; the former from 320,155 to 539,480; the latter from 1,337,000 to 1,488,803. The growth of the principal cities was as follows: Oklahoma City (q.v.), from 64,205 in 1910 to 91,295 in 1920; Tulsa (q.v.), 18,182 to 72,075; Muskogee, 25,278 to 30,277.

Agriculture. As Oklahoma is an important grain-producing State, agricultural conditions during the decade 1910–20 reflected the fluctuations of price and production which characterized war and post-war conditions. The general situation is discussed under AGRICULTURE, CORN, WHEAT, etc. Oklahoma is an important producer of cotton, and though not affected as much as some of the other cotton-producing States by the ravages of the boll weevil, which vary in intensity with the season, the damage and uncertainty were considerable in some years. The fluctuations of the cotton crop in the decade are indicated by the following figures: 1913, acreage, 3,009,000, production 840,000 bales; 1916, 2,562,000, and 823,000; 1920, 2,749,000, and 1,336,000; 1921, 2,206,000, and 481,000; 1922, 2,951,000, and 635,000. The estimated production for 1923 was 945,000 bales.

While the population of the State increased 22.4 per cent during the decade, the number of farms increased only 0.9 per cent (from 190,192 in 1910 to 191,988 in 1920). The total area of land in farms, however, increased from 28,859,353 acres to 31,951,934, or 10.7 per cent; and the improved land in farms, from 17,551,337 to 18,125,321 acres, or 3.3 per cent. The percentage of the total area in farm land increased from 65 in 1910 to 71.9 in 1920; the percentage of land improved from 39 5 to 40.8. The total value of farm property showed an apparent increase, from $918,198,882 to $1,660,423,544, or 80.8 per cent; the average value per farm, from $4828 to $8649. Of the total of 191,988 farms in 1920, 93,217 were operated by owners, 935 by managers, and 97,836 by tenants. The corresponding figures for 1910 were 85,404; 651, and 104,137. White farmers numbered 173,263 in 1920 and 169,521 in 1910. Colored farmers numbered 18,725 in 1920; 20,671 in 1910. Farms free from mortgage in 1920 numbered 30,551; those under mortgage, 47,025. In 1910, unmortgaged farms numbered 46,889; those under mortgage, 36,036. The total number of cattle in 1920 was 2,073,945, of which 808,459 were dairy cattle. In 1910, cattle numbered 1,953,560; dairy cattle, 530,796. Sheep in 1920 numbered 105,370; in 1910, 62,472. The number of hogs decreased notably from 1,839,030 to 1,304,094; owing to high prices for grain during the War, wheat being planted instead of corn. The estimated production of the principal farm crops in 1923 was as follows: corn, 39,491,000 bushels; wheat, 36,300,000 bush-

els; oats, 22,522,000 bushels; barley, 2,557,000 bushels; grain sorghum, 18,276,000 bushels; potatoes, 2,381,000 bushels; sweet potatoes, 1,880,000 bushels; hay, 935,000 tons. Comparative figures for 1913 are: corn, 52,250,000 bushels: wheat, 17,500,000; oats, 18.540,000; barley, 63,000; potatoes, 1,920,000; and hay, 382,000 tons.

Mining. Oklahoma, although it produces no metals, ranks fourth among the States in value of mineral production. This is due chiefly to the development of the petroleum fields in the State during the decade 1914–24. The production of petroleum, in 1914 was 73,631,724 barrels; (1915) 97,915,243; (1916) 107,071,715; (1917) 107,507,471; (1918) 103,347,070; (1920) 106,206,000; (1921) 114,634,000; (1922) 149,571,000. The production of natural gas kept pace with the development of the petroleum fields, the production in 1914 being 78,167,414 thousand cubic feet; 123,517,358 (1916); 124,317,179 (1918); 154,467,200 (1920); 124,058,000 (1921). The production of natural-gas gasoline became extremely important in the last few years; 178,856,929 gallons were produced in 1920 and 185,340,742 gallons in 1921. The coal production is about 4,000,000 tons annually; it was 3,988,613 tons in 1914; 4,813,447 in 1918, and 2,802,511 in 1922. In addition to the minerals mentioned, the State produces cement, gypsum, lead, sand and gravel, and stone. The total value of the mineral production of the State in 1921 was $269,882,786, compared with $493,320,359 in 1920; $291,078,174 in 1919; $336,857,921 in 1918; and $78,744,447 in 1914.

Manufactures. Oklahoma is not one of the leading industrial States, but its manufacturing activities have shown great increase in value of products and in number of persons employed in recent years. In 1920, there were 12 cities with 10,000 inhabitants or more, which contained 15 6 per cent of the total population of the State, and in 1919 reported 33.3 per cent of the value of the State's manufactured products. There were in the State 2310 manufacturing establishments in 1909; 2518 in 1914; and 2445 in 1919. Persons engaged in manufacture numbered 18,034, 22,700 and 38,314; and the capital invested amounted to $38,872,938, $65,477,654, and $277,034,318, in those years The value of manufactured products in 1909 was $53,682,405; in 1914, $102,005,693; and in 1919, $401,362,869. The large increase in value of products from 1914 to 1919, was chiefly due to changes in industrial conditions brought about by the War, and cannot be properly used to measure the growth of manufactures during the period; but the increase in number of wage earners clearly indicates growth in the manufacturing activities of the State. Petroleum-refining is the most important industry in point of value of product. This amounted to $1,055,000 in 1909; $13,014,000 in 1914; and $150,673,000 in 1919. Flourmill and gristmill products rank second in this respect, with a value, in 1909, of $19,144,000; 1914, $16,689,000; and 1919, $49,844,000. The smelting and refining of zinc, in third place, had a product, in 1909, valued at $3,002,000; 1914, $9,939,000; and 1919, $19,518,000 The manufacture of cottonseed oil and cake was fourth: valued in 1909 at $5,187,000; in 1914, $7,590,000; and in 1919, $18,907,000. The chief manufacturing cities are **Oklahoma City and Tulsa.** In Oklahoma City, there were 171 manufacturing establishments in 1909, with a product valued at $7868; 195 in 1914, with $20,726,000; and 227 in 1919, with $69,971,000. Tulsa had 53 establishments in 1909, with a product valued at $1563; 103 in 1914, with $3,868,000; and 135 in 1919, with $14,050,000. Other important manufacturing cities are Enid, Muskogee, Guthrie, and McAlester.

Education. Satisfactory progress was made in education in the decade 1914–24. The period witnessed a remarkable growth in the wealth and population of the State, which made possible better schools The average length of the school term was considerably increased during the decade, and additional teachers were employed. The normal school facilities, which had always been insufficient, were increased by the provision for normal training in certain selected high schools. There was a large increase in the number of schools offering high-school courses, and high-school opportunities to rural children were greatly extended by the organization of graded and consolidated districts. A large colored and Indian population greatly increased the educational difficulties of the State. The enrollment in the public schools increased from 496,908 in 1914 to 609,767 in 1921 The enrollment in white rural schools in 1920 was 544,821, and in colored rural schools, 44,461. In elementary rural schools for white pupils there were enrolled 517,317 in 1921; in white high schools, 47,893, in Negro elementary schools 42,938; and in Negro high schools, 1619. The expenditures for schools in 1921 was $28,368,688. The total enrollment in the graded schools for 1923 was 637,299; and the school expenditure in that year was $30,479,355. The percentage of illiteracy in the State decreased from 6.9 in 1910 to 4 7 in 1920: in the native white population, from 4.2 to 2 9 per cent; rose in foreign-born white, from 9.7 to 13 4; fell in negro, from 22 7 to 16.4.

Finance. For finance, see STATE FINANCES.

Political and Other Events. During the decade 1914–24 the State continued to be Democratic in politics. At elections held for governor and United States Senator in 1914, Senator Gore was reëlected, and R. L. Williams, the Democratic candidate, was elected governor. The Democrats also elected Representatives to Congress in all districts except one. On Jan. 21, 1915, the United States Supreme Court declared unconstitutional the so-called "grandfather clause" to the constitution, which disfranchised a large percentage of the negroes of the State. There was no election for State officers in 1916. In the presidential voting of this year President Wilson received 148,626 votes; Charles E. Hughes, 98,299. In 1918 Senator Owen was renominated by the Democrats, and Judge J. B. A. Robertson received the Democratic nomination for governor. Both were elected in November. Elections were held in 1920 for United States Senator John W. Harrold, Republican, defeated Scott Ferris, Democratic nominee, by a large majority. In the presidential voting of this year, W. G. Harding received 243,415 votes; J. M Cox, 215,521. An attempt was made in April, 1921, to impeach Gov. J. B. A. Robertson. This failed in the Legislature. On Mar. 22, 1922, Governor Robertson was arrested for bribery in connection with the insolvency of the Guarantee State Bank of Okmulgee. In the State election of 1922, J. C. Walton, Democratic candidate, was

elected governor. Alice Robertson, a Representative to Congress in 1920, was renominated by the Republicans, but was defeated. In the summer of 1923, as a result of alleged outrages by the Ku Klux Klan, Governor Walton placed the State under martial law. The Legislature denied his right to do this and wished to hold a special session in order to impeach him. Governor Walton denied their right to meet, and the members of the Legislature circulated a petition among themselves for a special session. The Adjutant-general of the State was ordered by the Governor to prevent their meeting, but the legislators entered the Capitol without hindrance, although they were prevented from assembling by an officer of the National Guard. An injunction was thereupon obtained preventing the National Guard from interfering. Previous to these events, Governor Walton had called a special election to pass on proposed amendments to the State constitution. One of these would permit the Legislature to assemble without the Governor's consent on a call of a majority of its members. The Attorney General attempted to have ballots for this measure cast by the Supreme Court, but the petition was denied. The Governor thereupon ordered out the National Guard to prevent the election. The local boards ordered the ballots printed, and citizens were urged to vote in spite of the Governor's proclamation to the contrary. At the special election the amendment was passed. Governor Walton then ordered the Legislature to meet but specified that it should devote its attention exclusively to the Ku Klux Klan. On assembling, the House at once began preparations for impeaching Governor Walton, and charges were filed with the Senate acting as a court of impeachment. The Legislature also passed a resolution for the investigation of the Ku Klux Klan, but the motion to expel members of the Klan from the House was defeated. In November, Governor Walton was found guilty on 11 counts, including charges that he had padded the State payroll, prevented the assembling of the Grand Jury, attempted to prevent a special State election, exceeded the legal limit of election expenses, and was generally incompetent. The Governor presented no defense. He was succeeded by the Lieutenant-Governor.

Legislation. Among the important acts of the Legislature in the decade 1914–24 were the following. A budget system was created by the Legislature of 1919. At this session also measures were passed defining and punishing criminal syndicalism and sabotage. In 1923 the Legislature passed a measure providing for industrial rehabilitation and farm or home aid for veterans of the War. A measure was also passed making robbery or its attempt punishable by a minimum of 25 years in prison. The Legislature also passed a bill prohibiting the Ku Klux Klan and members of other organizations from wearing masks in public.

OKLAHOMA, UNIVERSITY OF. A coeducational State institution at Norman, Okla., founded in 1892. The student enrollment was doubled in the decade between 1914 and 1923–24, from 1700 in the former year to 3401 in the latter. The faculty was increased in the same period from 135 to 203 and the library from 23,000 to 52,000 volumes. The income increased from $253,500 in 1916 to $1,020,000 in 1923–24. The School of Social Service was established and the department of manual training in the College of Engineering opened in 1917, special war courses were offered in 1918, and the School of Public and Private Business was organized in 1923 as a separate school with authority to grant the B.S. degree. Up to that time the B.A. degree with special certificate in public and private business had been conferred in the College of Arts and Sciences. An auditorium, a fine arts building, a library building, a geology building, a hospital and an armory were erected in 1920, and a women's building in the following year. Stratton D. Brooks was president during the period until 1923, when J. S. Buchanan became acting president.

OKLAHOMA CITY. The capital and commercial centre of Oklahoma. The population increased from 64,205 in 1910 to 91,295 in 1920, to 101,150 by estimate of the Bureau of the Census for 1923, and to 140,000 by local estimate in 1924. During the decade of 1914 to 1924, the city completed a $5,500,000 water system capable of supplying a much larger city, and a $1,000,000 power plant, and increased the value of its schools from $2,456,000 to $8,494,000. Bank clearings rose from $115,879,816 in 1914 to $1,165,341,665 in 1923.

OLD AGE PENSIONS, IN THE UNITED STATES. The United States adopted old age pensions very slowly. The proportion of aged persons in its population was considerably smaller than in some of the older countries; and its largely agricultural population did not show the evils of indigent old age so quickly as those of more thickly populated areas. Up to 1913, practically the only measures that had been taken to relieve the hardships of the old age of workmen were those of railroads and large industrial concerns, which provided for the retirement with pension of their own employees, usually at the age of 65. In most cases no contributions from the beneficiaries were required. The trade unions objected to this method of provision The employer admitted no legal claim to a pension and retained the right to withdraw the pension offer if an employee were guilty of misconduct, which discouraged strikes and tied the worker's hands. Old age insurance was offered by a very few trade unions and a few fraternal organizations. The pensioning of municipal, State and Federal employees, though growing, was still quite limited. Retirement funds for teachers, policemen, and firemen, however, were becoming common. Some provision for old age insurance through savings banks had been made in Massachusetts in 1907 and in Wisconsin in 1911. But the only comprehensive system was that of military and naval pensions; and in not one of the public measures was the lower-paid and most needy class of workers provided for.

Development in the decade 1914–24 continued for some time solely to affect public employees and workers in corporations. In 1915, the Winchester Arms Company installed a pension system affecting about 12,000 persons, and the Wells Fargo Express Company adopted a similar scheme in the following year. In 1920, Congress passed a comprehensive bill providing for the retirement of employees in the Civil Service, under which contributions by employees to the extent of 2½ per cent of their basic compensation, and retirement at 70 after 15 years of service, were compulsory, and old age and total disability pensions were granted in ratio to contribution and length of service. Beyond

the unsuccessful launching of an old age pension bill in Ohio in 1917, nothing had been accomplished up to this time in the way of old age pensions proper. But interest had by no means been dormant; in 1921–22 this gained impetus; labor organizations, church bodies, and industrial leaders took up the cry; in that year old age pension acts, of varying nature, were introduced in 15 State Legislatures and in Congress. Definite results came in 1923, when State laws for old age assistance were passed in Montana, Nevada, and Pennsylvania The Nevada law required that applicants be at least 60 years of age, citizens of the United States for at least 15 years, and residents of the State for at least 10 years The income of beneficiaries from pension and all other sources was not to exceed $1 per day. Inmates of prisons, workhouses, etc., were barred; also those who had been in prison for four months or more during the 10 years preceding, if such sentence were without the option of a fine; those who had within the preceding 10 years deserted spouse or failed to support children for six months, those who had children capable of and responsible for support; also those who owned property exceeding $3000. Where needed, a maximum funeral benefit of $100 was provided for Provisions were made for cases where claimant owns property. In the Pennsylvania act the pension age was 70, and the State residence requirement 15 years; in Montana, the pension age was 70 and the citizenship and State residence requirement 15 years; otherwise the provisions were essentially the same as those of the Nevada measure In Alaska, in 1923, the act of 1915 was amended to reduce the pension age from 65 to 60 for women, and increase the maximum monthly allowance from $12.50 for either sex to $25 for men and $45 for women: while the residence requirement was increased from 10 to 15 years. The growth of the movement was evident in other States, also. Old age pension bills, although they were not passed, became definite political issues in Ohio and Illinois; and Massachusetts and Indiana appointed commissions to study the subject. The desirability of a Federal system was beginning to be discussed, to prevent migration, and to equalize the burden that it might not bear too heavily on communities where the percentage of aged people was higher. Although so far the non contributory system appeared to be in favor, the compulsory-contributory type of protection was not without strong advocates who argued that this system was necessary to preserve the dignity of labor, to encourage thrift, and to conform to the principles of sound finance.

Other Countries. Expenditures for old age pensions increased as follows· in Denmark, from $2,643,125 in the fiscal year 1909–10, to $15,-959,400 in the fiscal year 1919–20; in Great Britain, from £8,468,128 in the fiscal year 1910–11, to £25,087,000 in 1920–21; in New Zealand, from £362,496 in 1910 to £731,343 in 1921; and in Australia (invalidity pensions included) from £1,868,648 in 1911 to £5,337,936 in 1923. This increase in aggregate expenditures during the decade was, however, largely due to increases in the pension rates to meet the reduced purchasing power of money. The percentage of persons assisted under pension laws likewise showed an increase in general. In Denmark, it rose from 2.4 in 1910 to 3.3 in 1920; in the latter year more than 34 per cent of the entire male population, and 48 per cent of the women, over 60 years of age, were pensioners. The number pensioned in Great Britain increased from 669,362 in 1910–11 to 1,029,307 in 1921–22. In 1915, of the entire population over 70, about 65 per cent were being thus supported. In New Zealand, however, the proportion of old age pensioners to total population, which was placed in 1910 at 1.8 per cent, fell to 1.6 per cent in 1920; and in Australia, while the proportion rose from 1.5 per cent in 1910 to 1.92 in 1921, there was a decline in 1923 to 1.91 per cent.

In 1919, Uruguay passed an old age pension law affecting all persons reaching the age of 60, and other entirely incapacitated and indigent, granting not less than 96 pesos or $99.28 annually, in cash or assistance, foreigners and naturalized citizens of 15 years' continuous residence being entitled to the benefits; the funds being drawn from increased taxes on employers, real estate, and on playing-cards and liquors. In England, the Old Age Pension Act of 1909, providing for weekly allowances of not more than 5 shillings to persons over 70 whose incomes were under $157 50 per year, was amended in 1916 to permit slightly increased allowances in needy cases, and in 1919 the allowance was raised to 10 shillings. The Act was latterly subject to much criticism. Although expenditures had risen rapidly, it was claimed that the allowance still was insufficient and that many who had left workhouses to accept pensions had returned. It was also said that the system was an incentive to fraud and improvidence in its existing form (although careful scrutiny of claims had brought the cost of administration almost to £1,000,000 annually), and an amendment to the law to give the pension to all citizens at the age of 70 regardless of means was proposed, but defeated, in 1923. France, in 1910, adopted a compulsory system of old age insurance which was expected practically to supersede the old age pension system, but this had not fulfilled expectations, and in 1924 measures to strengthen it were under consideration. Denmark raised the age limit for old age pensions from 60 to 65 years, in order to reduce expenditures. The old age pension systems of Australia (1916) and New Zealand (1898) seemed to be exempt from domestic criticism. The maximum annual allowances in those dominions were $162 and $130, respectively. Spain, in 1919, replaced its system of voluntary state-aided annuities with a compulsory insurance plan affecting all wage earners between 16 and 65 and in 1921 extended this to include all whose annual wage was less than 4000 pesetas ($772). In Italy, in 1920, the compulsory old age insurance act for seamen was replaced by one applying to practically all manual workers, salaried employees and professional classes. The temporary old age pension act passed in Belgium in 1920 was extended in 1923 for a further period of three years, a compulsory insurance law covering old age and death being meanwhile under consideration. In Germany, the compulsory old age and invalidity insurance law was amended in 1916, reducing the age limit from 75 to 65. The compulsory old age insurance law of Sweden, passed in 1913, was still the only law of universal application, affecting the entire population, from 16 to 67 years of age, with the exception of certain persons subject to state pensions.

OLMSTEAD, FREDERICK LAW (1870–). An American landscape architect (see VOL. XVII). From 1902 to 1917 he was landscape architect for the Baltimore Park Commission and from 1908 landscape architect for the Sage Foundation Homes Company He was professor of landscape architecture at Harvard University, 1903–14, and during 1910–19 he was a member of the National Commission of Fine Arts. He was chairman of the Executive Committee of the National Conference on City Planning from 1910 to 1919 and was governor of the American City Planning Institute. In 1917–18 he was a member of the Commission on Emergency Construction of the War Industries Board and during the same period manager of the town planning division of the United States Housing Corporation

OLYMPIC GAMES. The first Olympic Games since the War were held at Antwerp, Belgium, in 1920, the athletes of the United States repeating their triumph of 1912 at Stockholm, Sweden. In the track and field events the Americans scored more than double the number of points collected by their nearest competitor. The final standing of the various countries entered was: United States, 212 points; Finland, 105; Sweden, 95; England, 92; France, 35; Italy, 28; South Africa, 24; Canada, 10; Norway, 10; Denmark, 9; Esthonia, 8; New Zealand, 5; Belgium, 5; Australia, 5; Czecho-Slovakia, 3; Holland, 2; Luxemburg, 1.

Five new world's and three new Olympic records were made as follows: 400-meter hurdles, Loomis, U. S., 54 seconds (world); pole vault, Foss, United States, 13 feet, 5⅛ inches (world); 400-meter relay, U. S team, 42⅕ seconds (world); javelin throw, Myrra, Finland, 215 feet, 9¼ inches (world); 110-meter high hurdles, Thompson, Canada, 14⅘ seconds (world); throwing 56-pound weight, McDonald, U. S., 36 feet, 11½ inches (Olympic); running high jump, Landon, U. S., 6 feet, 4⅕ inches (Olympic); Marathon, Kolehmainen, Finland, 2 hours, 32 minutes, 35⅘ seconds (Olympic).

The United States also won a sweeping victory in the swimming events, chiefly because of the fine work of Duke Kahanamoku, Pua Kealoha and Warren Kealoha, all of the Hawaiian Islands. Great Britain captured the final water polo match from Belgium by a score of 3 to 2. In women's swimming the United States again showed marked superiority through the brilliant efforts of Ethelda Bleibtrey, Aileen Riggin and Frances Cowells-Schroth In rowing the United States Naval Academy won the eight-oared event; the American Kelly took the single sculls and Switzerland triumphed in the four-oared contest. The U. S. trap shooting team won, and Mark Arie of the United States carried off the individual championship. Canada won the hockey honors with the United States second. Great Britain was victor in the tennis competition, the United States being unrepresented because of the demands made upon the American players by the Davis Cup matches.

The first women's Olympic Games were held at Paris in 1922, the points being distributed among the various countries as follows: England, 50; United States, 31; France, 29; Czecho-Slovakia, 12; Switzerland, 6. In the 60-meter dash Mlle. B. Mejzlikova of Czecho-Slovakia set a new world's record of 7⅘ seconds. Miss Camelia of the United States also distinguished herself by running the 100-yard hurdles in 14⅖ seconds.

The Olympic Games of 1924, held at the Colombes Stadium, near Paris, France, attracted entries from forty-five nations, twenty-seven of which were medal winners The United States teams once more showed their supremacy, capturing the all-around championship through six months of keenest competition and carrying off the honors in track and field sports, rowing, swimming, tennis, Rugby, boxing, catch-as-catch-can wrestling, and rifle, pistol and target shooting.

In the track and field events the points were distributed among the various countries as follows: United States, 255; Finland, 166; Great Britain, 85½; Sweden, 31½; France, 26½; Italy, 19; Switzerland, 15; South Africa, 11; Hungary, 10½; Australia, 10; Canada, 8; Norway, 6; Argentina, 5; New Zealand, Holland and Esthonia, 4 each; Denmark, 3; Japan and Chile, 1 each.

The winners in the various events were: 10,000-meter run, Willie Ritola, Finland, 30 minutes, 23⅕ seconds (world's record); javelin throw, J. Myrra, Finland, 207 feet; 100-meter dash, H. Abrahams, Great Britain, 10⅘ seconds (equals Olympic record); 400-meter hurdles, F. M. Taylor, United States, 52⅖ seconds (world's record); high jump, H. M. Osborne, U. S., 6 feet, 6 inches (Olympic record); pentathlon, Lehtonen, Finland (in this contest Robert Le Gendre, U. S., set a world's record of 25 feet, 6 inches for the broad jump); 800-meter run, D. G. A. Lowe, Great Britain, 1 minute, 52⅘ seconds; broad jump, De Hart E. Hubbard, U. S., 24 feet, 6 inches; shot put, Clarence Houser, U. S., 49 feet, 2½ inches; 110-meter hurdles, D. Kinsey, U. S., 15 seconds; 200-meter dash, J. V. Scholz, U. S., 21⅗ seconds (equals Olympic record), 3000-meter steeplechase, Willie Ritola, Finland, 9 minutes, 33⅗ seconds (world's record); 1500-meter run, Paavo Nurmi, Finland, 3 minutes, 53⅗ seconds (Olympic record); 5000-meter run, Paavo Nurmi, Finland, 14 minutes, 31⅕ seconds (Olympic record); hammer throw, F. D. Tootell, U. S., 174 feet; pole vault, L. Barnes, U. S., 12 feet, 11½ inches; 400-meter run, E. H. Liddell, Great Britain, 47⅗ seconds (world's record); 10,000-meter cross country run, Paavo Nurmi, Finland team, 32 minutes, 54⅗ seconds; hop, step and jump, Winter, Australia, 50 feet, 11¼ inches (world's record); decathlon, H. M Osborne, U. S., 7,710 775 points (world's record); 400-meter relay, United States team, 41 seconds (world's record); discus throw, Clarence Houser, U. S., 46 meters, 15½ centimeters (Olympic record); 1600-meter relay, United States team, 3 minutes, 16 seconds (world's record); 3000-meter team race, Finland, 8 minutes, 32 seconds (Olympic record); 10,000-meter walk, U. Frigerio, Italy, 47 minutes, 49 seconds; marathon, Stenroos, Finland, 2 hours, 42 minutes, 22⅗ seconds.

The United States won an even more sweeping victory in the swimming competitions, scoring 217 points, Sweden being second with 58 and Great Britain third with 50. John Weissmuller, U. S., set new Olympic records in the 100-meter and 400-meter free style events for men. Miss Sybil Bauer, U. S., established a world's record in the 100-meter back stroke competition for women, and Miss Ethel Lackie, U. S., equaled the world's record in the 100-meter free style contest.

In tennis the United States also had a walkover, Vincent Richards winning the final of the men's singles from Henri Cochet of France, Miss Helen Wills capturing the women's singles from Miss Emilienne Vlasto of France, Richards and Francis T. Hunter taking the men's doubles and Miss Wills and Mrs. George W. Wightman triumphing in the women's doubles.

OMAHA. The largest city of Nebraska. The population rose from 156,231 in 1910 to 191,601 in 1920; to 208,025 by estimate of the Bureau of the Census for 1924, and to 217,329 by the school census for the same year. A comprehensive zoning ordinance was adopted in 1920. In the same year the Metropolitan Utilities District with plant valuation of $13,000,000 was organized, controlling the city-owned gas and water systems; 60 miles of water mains were laid in 1923 and three 50,000,000-gallon pumps were installed in the water plant. The paved streets increased from 209 miles in 1915 to 402 miles in 1924; of this, 76 miles were laid in 1922 and 1923. In the latter year a technical high school was built at a cost of $3,500,000, and a $750,000 high school was under construction in 1924. Omaha is an important packing center and in 1924 held second place among the livestock markets of the United States; 73 per cent of the 8,500,000 head of cattle, hogs, and sheep received here was consumed in the fourteen packing plants of the city

OMAN. See ARABIA.

OMSK GOVERNMENT. See SIBERIA AND THE FAR EASTERN REPUBLIC.

ONCKEN, HERMANN (1869–). A German historian and professor. He contributed largely to the war literature of his country Among his works are *Amerika und die Grossen Machte: Historisch-politische Aufsatze* (1914), *Deutschlands Weltkrieg und die Deutsch-Amerikaner* (1914); *Unsere Abrechnung mit England* (1915); *Wie Ehrt ein Volk Seine Grossen Manner?* (1915); *Das Alte und das neue Mitteleuropa* (1917); *Ueber den Zusammenhang von Innerer und Aeusserer Politik* (1918); *Weltgeschichte und Versailler Friede* (1921); *Die Utopie des Thomas Mores und das Machtproblem in der Staatslehre* (1921); *Staatsnation und Kulturnation* (1922); *Lassalle* (1922); *Die Historische Rhein-politik der Franzosen* (1922); and *Aus Rankes Fruhzeit* (1922).

O'NEILL, EUGENE (GLADSTONE) (1888–). An American playwright, born in New York City, the son of James O'Neill, a celebrated actor. He was educated at De La Salle Institute and Princeton (1906–07) and Harvard University (1914–15). In 1909 he went to San Francisco and thence to Central America on a gold prospecting venture. After 1914, devoting himself to playwriting, he produced *The Moon of the Caribbees and Other Plays of the Sea* (1919); *Beyond the Horizon*, a tragedy in six acts (1919); *Thirst and Other Plays* (1914); *Emperor Jones*, an extraordinary monologue depicting the psychology of fear; *Diff'rent* (1921); *The Straw* (1921); *Gold* (1921); *Anna Christie* (1922); *The First Man* and *The Hairy Ape* (1922); *The Fountain* (1923); *Welded*, and *All God's Chillun's Got Wings* (1924). He stands first among American dramatists; in his works lies the hope of a fine native drama. Some of his plays have been produced in Europe.

ONTARIO. A Canadian province, with an area of 407,262 square miles, of which 365,880 square miles are land area. Population in 1911, 2,527,292; in 1921, 2,933,662, or a gain of 16 per cent. In 1921, the rural population made up 41.8 per cent of the total as compared with 47.4 per cent in 1911. The male population numbered 1,481,890; females 1,451,772, in 1921. The leading cities, with their populations in 1921, were: Toronto, 521,893 (381,833 in 1911); Ottawa, the capital of Canada, 107,843 (87,062 in 1911); Hamilton, 114,151 (81,969 in 1911); London, 60,959 (46,300 in 1911).

Industry. While agriculture was the leading activity of the province, it was evident that by no means all its possibilities were yet exploited. Only 14,000,000 acres were under cultivation in 1923, and it was estimated that northern Ontario alone contained some 20,000,000 acres ready for the plow. Diversified farming, including dairying, was becoming the rule. In 1923, 10,296,961 acres were under field crops; the more important were hay and clover, 3,596,484 acres; oats, 2,967,417; wheat, 828,908; there were also considerable yields of barley, peas, corn, fodder corn, sugar beets, and other root crops. The total value was $220,748,900 ($196,220,000 in 1914). The growing attention accorded dairying and the meat industry was indicated in the increase of live stock. Cattle in 1922 numbered 2,838,087 and 2,601,086 in 1913; sheep in 1923 and in 1913 were 907,673 and 705,848. In 1922 there were 1053 creameries and factories which produced more than one-third of all Canada's butter, five-eighths of the total cheese production, and nine-tenths of the condensed and evaporated milk. The total value of these products was $53,542,605 (about $18,000,000 in 1910). Fruit culture, particularly apples, and the production of tobacco and sugar beets were rapidly spreading in the southern districts. In 1920, 20,114 acres were under tobacco; this fell to 8630 acres in 1923. Under sugar beets were 36,288 acres (22,450 acres in 1923). Ontario led the other provinces in wool production; the 1921 output was valued at $6,953,824. In 1923, all agricultural products for the province were valued at $400,511,000, the total for the Dominion being $1,342,132,000. Farmers' organizations were widely prevalent, and many of them concerned themselves seriously with the problem of cooperative marketing. Such plans for the dairymen and fruit growers received the support of the government. Attention was also directed by an interested agricultural ministry to the necessity of creating cooperative credit societies. Other industries yielded: fisheries, in 1921, $3,065,042, made up of fresh-water catches of herring, pickerel, pike, trout, and whitefish; forest products in 1921, $26,193,280, made up of lumber, shingles, and lath. In the value of lumber cut away and in the making of lath, Ontario led all the other provinces. In the manufacture of pulp and the production of paper, Ontario was second only to Quebec. For 1920, $59,647,000 in paper was turned out.

In mining activities, too, Ontario led all the other provinces. Figures for metallic production for 1922 were: gold, $20,678,862; silver, $31,280; nickel, $6,158,993; copper, $1,464,477; total, including all others, $37,737,252. Nonmetallic minerals, including natural gas, crude petroleum, structural materials, and clay products, yielded $28,128,777. Grand total for 1922, $65,866,029; for 1911, $42,796,162. There were 91 mining companies incorporated in Ontario

with a capital of $181,040,000. In 1922, the Ontario mineral output was 36 per cent of the total Canadian production. Under the active administration of the Hydro-Electric Commission, the extension of the use of water power for energy went on. By 1922, 214 municipalities, 47 townships, and 48 commercial institutions were being served. Revenues for 1922 were $12,756,104, and costs of maintenance, etc., together with sinking fund, $11,343,766; this left a surplus of $1,412,338. (Revenues for 1913 were $2,611,918) The growth of this experiment in public ownership may be gathered from the following: 1910: horse power, 750; municipalities and townships, 10; 1923: horse power, 1,299,230; municipalities, etc., 214. Total assets of the Commission and the municipalities, in 1913, $11,907,826; in 1922, $55,126,834. Many projects were under way; one of the most important was the Chippewa Canal scheme which was to produce 600,000 horse power at a construction cost estimated at $70,000,000. This plan, because of its ambitious nature, aroused discussion of a very controversial character.

Manufacturing prospered and Ontario continued to lead all the provinces In 1921 there were 18,093 industrial establishments (8001 in 1910), capitalized at $1,620,681,181, and employing 258,345 workers (238,817 in 1910). Costs of materials were $744,433,905, and the value of the output was $1,411,276,431 ($579,810,225 in 1910). Leading industries were machinery, building construction, milling, packing, leather, boot and shoe production, hosiery, and rubber products.

Trade and Communications. In 1922 there were 10,881 miles of railway, as compared with 9000 in 1913 In 1919 there were 747,893 miles of telegraph wire (375,933 in 1912). In 1922–23 exports amounted to $372,734,182 ($132,756,532 in 1913) and imports to $406,946,109 ($301,651,328 in 1913).

Government. For 1913–14, revenues and expenditures were $11,121,382 and $11,819,311; by 1921–22, they had become $39,725,370 and $37,442,986 The Dominion subsidy and receipts from lands and forests had shown no increase, but new revenues were derived from succession duties and corporation taxes. The direct liabilities of the province by 1922 had risen to $204,959,690. Under an act of 1921 the province was empowered to enter the banking business for the carrying of savings accounts and life insurance business. The purpose was the application of such funds toward agricultural credits. On Jan 1, 1923, there was $3,864,091 in deposits in the provincial banks. There were, in 1921, 7231 elementary and secondary schools attended by 632,123 pupils (518,605 pupils in 1911). Besides, there were 621 separate Catholic schools with an enrollment of 83,977. The 1921 budget bore $5,919,055 for education ($842,278 in 1912). Total expenditures on education, provincial and local, in 1912, $13,492,108; in 1920, $36,739,564. The provincial university, the University of Toronto, was attended by 5100 pupils in 1921–22 Women were granted the ballot in 1918 and permitted to stand for the provincial legislature. In the Dominion Parliament the representation remained the same: House of Commons, 82; Senate, 24.

ORANGE FREE STATE. See SOUTH AFRICA, UNION OF.

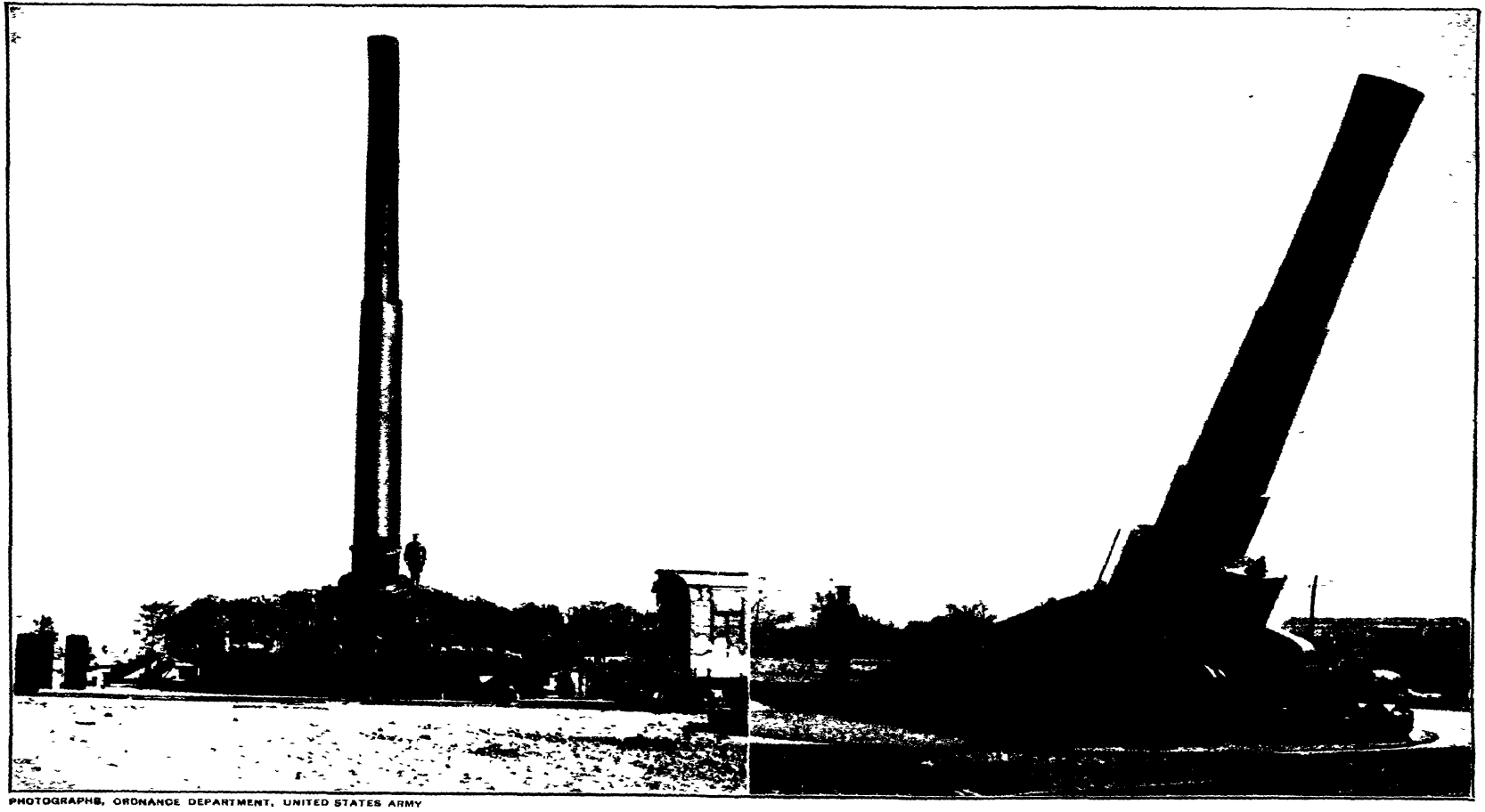
ORATORIO. See MUSIC.

ORAVA. See TESCHEN, ZIPS, AND ORAVA QUESTIONS.

ORDNANCE. The War—greatest of international conflicts—had a correspondingly great effect on the development of implements of war, collectively called ordnance. The ingenuity of a nation fighting for existence, with its back to the wall, is stimulated to the utmost in developing means for overcoming the common enemy Science, engineering, and industry united in strenuous endeavors to make more effective the nation's man power by supplementing it with every mechanical improvement over man himself. Matériel, as contrasted with personnel, became to a greater and greater extent the determining factor in warfare—but another phase of the industrial revolution characteristic of the last century. Ordnance comprises all the things the soldier fights with, as distinguished from the material things that merely provide him with a more or less comfortable existence, such as food, clothing, shoes, shelter, fuel, means of transportation, etc. The ordnance equipment of a modern army includes about 1200 separate and distinct types of units, which in their assembly require the manufacture of 250,000 separate and distinct components.

The infantryman requires shoulder rifles by the million; cartridges for them by the billion; light one-man automatic rifles by tens of thousands for use in tight places calling for short concerted bursts of fire; heavy machine guns by thousands for playing the continuous leaden stream of the modern machine-gun barrage; sensitive sights and rugged tripods with elevation and traverse devices to insure placing the deadly hail with safety to his own advancing lines and maximum damage to the enemy; carts to carry his machine guns and water jackets to cool them; rifle grenades and rifle attachments to throw them; explosive hand grenades for defense against enemy raiding parties and for mopping up trenches on the offensive; gas grenades for making enemy dugouts uninhabitable and Thermit grenades for fusing the breech mechanism of captured enemy cannon and machine guns, continued possession of which is doubtful; bayonets and bolos, trench knives, helmets, periscopes, range finders, etc, not to mention the "baby" 37-mm. cannon for wiping out hostile machine gun nests and 3-inch trench mortars of simple yet most effective design.

The artilleryman requires field pieces by the thousand for divisional artillery—the "75" gun and its companion piece, the 105-mm. howitzer; heavy pieces for corps artillery—the 4 7-inch gun and its companion piece, the 155-mm. howitzer; high-powered, medium-calibre pieces for army artillery—155-mm. guns and 8-inch howitzers; 8-, 10-, 12- and 14-inch guns and 16-inch howitzers on railway mounts to reach the enemy's back area; 16-inch guns on permanent barbette emplacements for coastal defense; self-propelled caterpillar mounts for all calibres from the 75-mm gun to the 240-mm. howitzer, capable of negotiating steep grades, accompanying its tactical unit at all speeds and ready to go into action immediately on arrival at the firing-point and depart to safer regions immediately its mission is accomplished. For the effective use of his weapons, the artilleryman requires vast quantities of ammunition: shrapnel, high-explosive shells and gas shells by millions of rounds, each an intricate mechanism in itself.

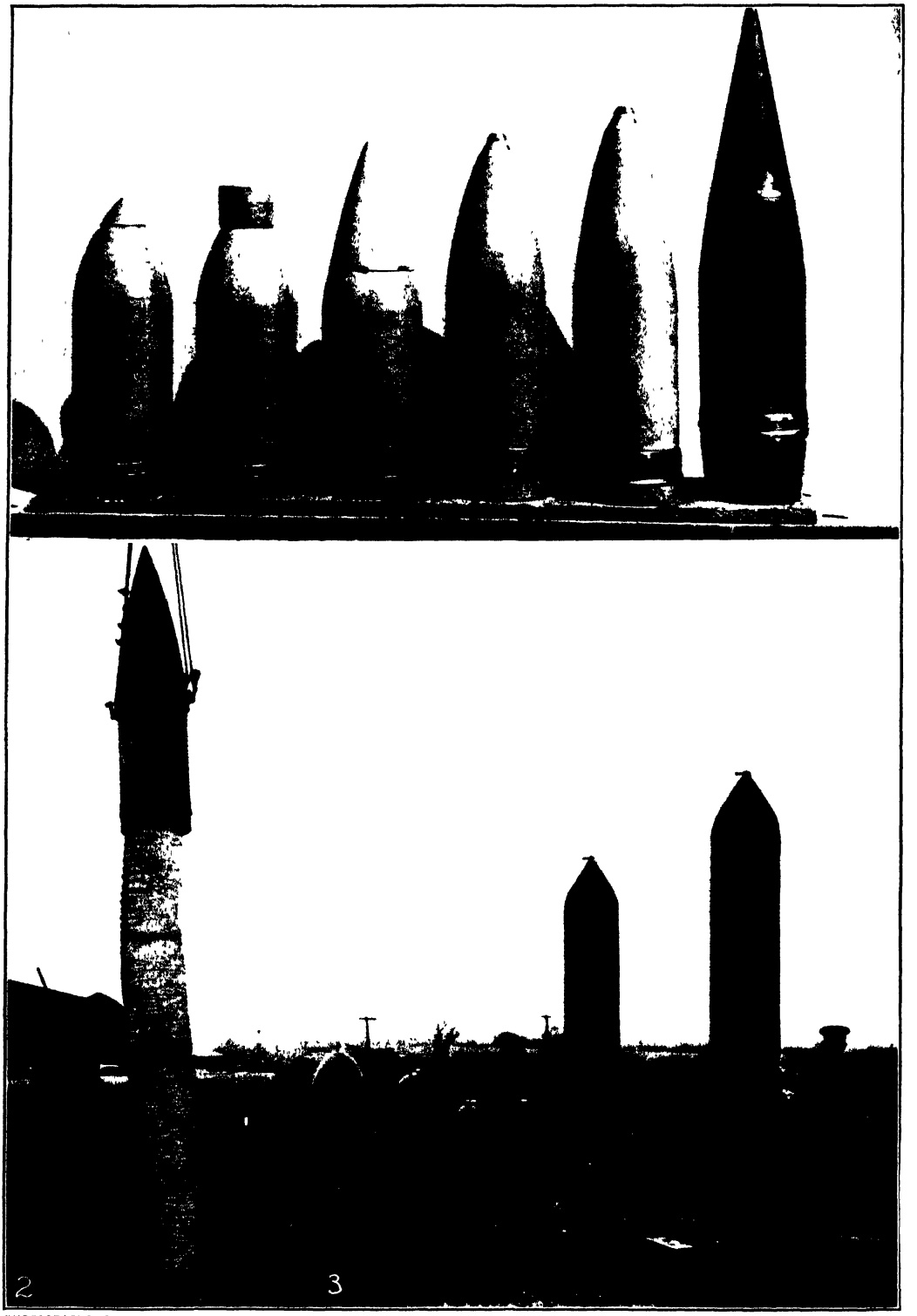


PHOTOGRAPHS, ORDNANCE DEPARTMENT, UNITED STATES ARMY

UNITED STATES ARMY ORDNANCE

Sixteen-inch Gun No. 2, 1919 MII, on Barbette Carriage No. 1, 1919. Elevation 65°

Sixteen inch Howitzer Mounted on Howitzer Carriage No. 1, Model 1920. **Elevation 65°.**



PHOTOGRAPHS, ORDNANCE DEPARTMENT, UNITED STATES ARMY

UNITED STATES ARMY ORDNANCE

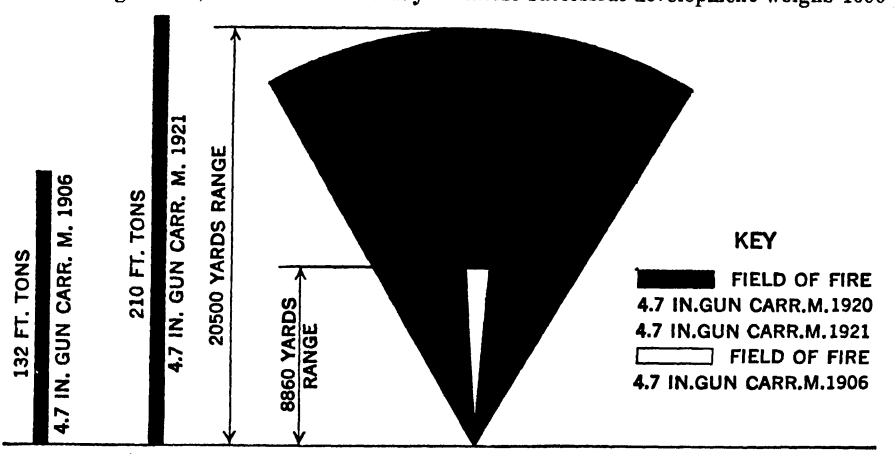
1. Various Types of 6 inch Projectiles
2. Projectile (Weight 2340 Pounds) and Powder Charge (650 Pounds) for 16-inch United States Army Gun for Range of 55,000 Yards

The aviator requires stripped machine guns speeded up to 1400 shots per minute, adjusted with inconceivable nicety to shoot between the rapidly revolving blades of his propeller; electric heaters to prevent freezing of the lubricating system of his gun mechanism at high altitudes; shot counters to indicate the available amount of ammunition remaining; armor-piercing bullets for use against armored airplanes or in low flying action against tanks; incendiary bullets to ignite the gas contents of enemy captive balloons and dirigibles; tracer bullets to assist in correcting his aim; ingenious sights to correct automatically for the relative speed and direction of his own plane and his target; airplane bombs, from the small 25-pound fragmentation type for use against enemy troops, to the 4000-pound bomb for attack on battleships or fortified enemy positions; bomb sights to determine the proper instant for release, and release mechanisms to carry his huge instruments of destruction with safety to himself and to release them accurately in order to inflict the most damage on the enemy.

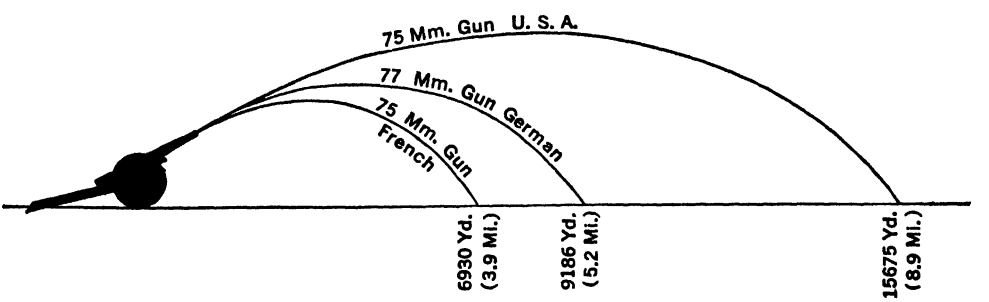
To supplement the waves of attacking infantry, light two-man tanks equipped with a single machine gun; heavy tanks equipped with 37-mm. cannon and four machine guns—urged irresistibly forward by 500-horse power Liberty engines crossing trench systems, shell craters and other obstacles by means of its powerful caterpillar track-laying mechanism—are needed.

Pyrotechnics are drafted into war service to obtain communication among the various elements of attacking waves, to smoke-screen daylight raids, to illuminate the immediate foreground and thereby prevent surprise night attacks, as well as to guide night-flying airmen to a safe landing on an otherwise unilluminated landing field.

The cost of equipping a modern army with necessary amounts of up-to-date ordnance can be sensed from the estimates of 12½ billion dollars made for the equipment of the first five million American troops called to the colors during the War. The impetus given to ordnance design by that conflict has continued, inasmuch as the length of time in which the United States was actively in the War did not permit the full development of many promising devices. While accurate information in regard to advances in the field of ordnance design by other armies is not available, it can safely be assumed that they have made at least as much progress in this direction as a recent announcement indicates has been made in the United States Army. A general idea of the relative effectiveness of ordnance used during the War and that developed since the Armistice can be gained from the statement that in the United States Army, the new 75-mm. gun has twice the range of the French "75" used in 1918; the new 4.7-inch gun has two and one-half times the range of the pre-war model and fires a heavier projectile; the new 155-mm. gun outranges the French gun of the same calibre used during the War, by nearly five miles; the largest aërial bomb effectively used during the War weighed only 400 pounds; the latest successful development weighs 4000 pounds



DIAGRAMATIC COMPARISON OF U. S. A. 4.7-INCH FIELD GUNS
Models of 1906 and 1920–1921



COMPARISON OF LIGHT FIELD ARTILLERY
Weight of Projectile
U. S. A. Gun—15 lb.
French Gun—12.2 lb
German Gun—14.96 lb.

and contains over a ton of explosive; the 50-calibre super-machine gun shoots a bullet weighing four times as much as the 0.30 calibre Browning and has three times the range of the weapon used in the War; the latest caterpillar mount for divisional artillery has attained a maximum speed of 30 miles on good roads, as contrasted with the 8 or 10-mile per hour maximum of the War. See ARTILLERY; EXPLOSIVES; GUNS, NAVAL; PROJECTILE; SMALL ARMS; TRENCH WARFARE MATERIAL; STRATEGY AND TACTICS.

ORE DEPOSITS. See GEOLOGY, ECONOMIC; ALSO GEOLOGY.

OREGON. Oregon is the ninth State in size (96,699 square miles), and the thirty-fourth in population; capital, Salem. The population increased from 672,765 in 1910 to 783,389 in 1920, a gain of 16.4 per cent. The white population increased from 655,090 to 769,146, while the Indian population decreased from 5090 to 4590; the Chinese decreased from 7363 to 3090, and the Japanese increased from 3418 to 4151. The negro population showed an increase of from 1492 to 2144; and the native white, from 552,089 to 666,995. The foreign-born white population decreased from 103,001 to 102,151. Both urban and rural populations mounted during the decade: the former from 307,060 to 391,019; the latter from 365,705 to 392,370. The growth of the principal cities was as follows: Portland (q.v.), from 207,214 in 1910 to 258,288 in 1920; Astoria, 9599 to 14,027; Salem, 14,094 to 17,679.

Agriculture. As Oregon is one of the important grain-growing States, agricultural conditions were affected in the decade 1913–23 by the fluctuations in price and production of grains during the War and post-war period. This situation is treated in detail under AGRICULTURE, CORN, WHEAT, BARLEY, etc. While the population of the State increased 16.4 per cent in the decade, the number of farms increased 10.3 per cent (from 45,502 in 1910 to 50,206 in 1920); the acreage in farms increased from 11,685,110 to 13,542,318; and the improved land in farms, from 4,274,803 to 4,913,851 acres. The percentage of total land area in farms increased from 19.1 in 1910 to 22.1 in 1920; the percentage of improved land in farms, from 7 to 8 per cent. The total value of farm property apparently increased 55 per cent in the decade, from $528,243,782 to $818,559,751; the average value per farm, from $11,609 to $16,304. In interpreting these values and all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 50,206 farms in 1920, 39,863 were operated by owners, 916 by managers, and 9427 by tenants. The corresponding figures for 1910 were 37,796, 847, and 6859. White farmers in 1920 numbered 49,633, compared with 44,875 in 1910; colored farmers numbered 573, compared with 627. Farms free from mortgage in 1920 numbered 18,077, and those under mortgage, 17,843; in 1910, 24,855 farms were free from mortgage, and 12,632 were mortgaged. The total number of cattle in 1920 was 851,108; in 1910, 725,255. Of these, 280,411 in 1920 were dairy cattle; in 1910, 172,550. The number of hogs increased from 217,577 to 266,778; the number of sheep decreased from 2,699,135 to 2,002,378. The estimated production of the principal crops in 1923 was as follows: corn, 2,344,000 bushels; spring wheat, 4,565,000 bushels; winter wheat, 21,725,000 bushels; oats, 10,773,000 bushels; barley, 3,234,000 bushels; potatoes, 5,852,000 bushels; hay, 2,103,000 tons; and apples, 7,253,000 bushels. Comparative figures for 1913 are: corn, 598,000 bushels; wheat, 15,717,000; oats, 15,228,000; barley, 4,200,000; potatoes, 6,750,000; and hay, 1,732,000 tons.

Mining. The mineral resources of Oregon are not fully developed. Among the minerals produced are sand and gravel, gold, copper, silver, cement, and stone. The production of gold, copper and silver during the decade 1914–24 was as shown in the table. In addition to the minerals mentioned above, the State also produces mineral waters and a small quantity of natural gas. The total value of the mineral products in 1921 was $5,199,803, compared with $5,496,253 in 1920; $3,962,822 in 1919; $4,191,740 in 1918; and $3,331,132 in 1914.

MINERAL PRODUCTION IN OREGON

Year	Gold Valued at	Silver Fine Ounces	Copper Pounds
1914	$1,591,461	142,552	39,248
1916	1,902,179	231,342	3,581,886
1918	1,270,465	107,323	2,451,016
1920	1,017,490	82,743	2,355,276
1921	822,034	42,120	174,300
1922	631,568	. . . .	. .

Manufactures. Oregon is not one of the most important industrial States, but its manufacturing activities are constantly increasing In 1920 there were in the State four cities with more than 10,000 inhabitants, forming 38.4 per cent of the total population of the State; and these, in 1919, reported 60 4 per cent of the State's manufactured products. There were in the State 2246 manufacturing establishments in 1909; 2320 in 1914, 2707 in 1919. Persons engaged in manufacture numbered 34,722, 35,449, and 68,005, and the capital invested amounted to $89,081,873, $139,500,379, and $237,254,736 in those years. The value of products in 1909 amounted to $93,004,845; in 1914, $109,761,951; and in 1919, $366,782,627 The increase in value of products in 1914–19 was in great measure due to changes in industrial conditions brought about by the War and cannot be taken as an index of the growth of manufactures during that period; but the increase in the average number of persons employed clearly shows steady growth in the manufacturing activities of the State. The first industry in point of value of products is that relating to lumber and timber products: in 1909, valued at $30,200,000; 1914, $30,920,000; and 1919, $95,264,000. Flourmill and gristmill products rank second in this respect: in 1909, $8,801,000, 1914, $11,193,000; 1919, $42,550,000. Foundry and machine-shop products, in third place, were valued, in 1909, at $3,135,000; in 1914, $3,823,000; and in 1919, $31,689,000. Slaughtering and meat packing, next in order, had products valued in 1900 at $5,880,000; in 1914, $7,487,000; and in 1919, $15,868,000. The chief manufacturing city is Portland; other less important are Astoria, Eugene and Salem. In 1909, there were in Portland 649 manufacturing establishments, with a product valued at $46,861,000; 837 in 1914, with $55,697,000; and 846 in 1919, with $196,380,000.

Education. Oregon is one of the most progressive States in educational matters, and the high standard of efficiency in its educational system was maintained in the decade 1914–24. A new compulsory education law was adopted by the people at the general election held in November, 1922, by the terms of which all children between the ages of 9 and 15 were required to attend school for a term or period of not less or more than the number of months the public school holds session in the district in which their parents or guardians reside. The history of the State is required to be taught in the schools, and there are also courses in moral instruction and physical education. In 1918, the Legislature enacted a physical education law making it mandatory that all pupils in the elementary and secondary schools receive physical training for an average of at least 20 minutes a day. Progress was made during the decade in the rural schools and in nearly every county of the State consolidation was under way. The total number of consolidations for elementary schools for 1923 was 77, with an enrollment of 5585 pupils. In 1914, the State adopted a uniform system of standards for country and village schools. A movement for junior high schools developed. The Legislature of 1919 established a State Board for Vocational Education and substantial progress was made in this field, in agriculture, home economics, and technical training. The total enrollment in the elementary schools in 1920–21 was 160,924; in the high schools, it was 29,235; and the expenditure for educational purposes was $14,783,718. Illiteracy in the State decreased from 2.2 per cent in 1910 to 1.8 per cent in 1920; in the native white population it remained at 0.5 per cent; among the foreign-born white, it decreased from 5.9 to 5.4 per cent; among the Negro, it increased from 3.7 to 5.5 per cent.

Finance. For finance, see STATE FINANCES.

Political and Other Events. The Democratic and Republican parties alternated in political control of important offices in Oregon in the decade 1914–24. In 1914 elections were held for governor and for United States Senator. The Republican candidate for governor, James Withycombe, was elected; the Democrats re-elected Senator Chamberlain. In this election an amendment to the constitution, adopted by a large majority, prohibited the sale or manufacture within the State of intoxicants, but permitted importations. An amendment abolishing capital punishment was also adopted, but six years later capital punishment was restored by vote of the people. In a special election held in January, 1915, Kathryn Clark was elected State Senator; she was the first woman to fill this position. Women participated in the elections for the first time in 1916. Minor State officers only were chosen. In the presidential voting of this year, Charles E. Hughes received 126,968 votes; Woodrow Wilson, 120,125. The prohibition section of the constitution adopted in 1914 was in this year amended to prohibit importation of intoxicants into the State. An amendment empowering the governor to veto single items in appropriation bills was also carried. On June 7, 1916, the Columbia River Highway, one of the greatest scenic roadways ever constructed, was dedicated. In 1917 the policy of expending automobile license revenues on permanent highway construction was adopted. Through capitalization of these revenues, more than $40,000,000 was expended on pavement of trunk highways. Elections were held in 1918 for governor and United States Senator. Governor Withycombe was re-elected, and Charles L. McNary, who had been appointed United States Senator on the death of Senator Lane, was elected to the Senate. Governor Withycombe died in office, Mar. 3, 1919, and was succeeded by Secretary of State Ben W. Olcott. There was an election in 1920 for United States Senator. Senator Chamberlain, a candidate for reëlection, was victoriously opposed by Robert N. Stanfield, Republican. In the presidential voting of this year, Warren G. Harding received 143,592 votes; James M. Cox, 80,019. The Democrats in 1922 elected their candidate for governor, Walter M. Pierce, who defeated Governor Olcott, Republican. At this election the voters adopted a compulsory school law which required that children over 8 and under 16 years of age be sent to the public schools during the school year. This law was framed with a view of suppressing private and parochial schools. It was sponsored by the Scottish Rite Masons and was supported by the Ku Klux Klan. The law was declared unconstitutional by the United States District Court, Mar. 31, 1924. Governor Pierce was inaugurated in January, 1923. In his message to the Legislature he recommended reductions in the State appropriations and called for a general revision of the system of taxation.

Legislation. The most important acts of the Legislature in the decade 1914–24 are given below. In 1915 a law was enacted, in accordance with the vote of the people in 1914, to prohibit the sale or manufacture of liquor in the State; but it permitted importations in limited quantities to individuals. In 1917, at the request of Secretary Lansing, the Legislature withdrew certain anti-alien bills designed to prevent Japanese from owning land in the State. Provision was made for a rural credit system and for the establishment of county tuberculosis sanitoria and hospitals. This Legislature also passed a "bone-dry" prohibition bill and amended the laws relating to courts. Further amendments in the laws relating to the judiciary were made in 1919 This Legislature also created a legislative reference service and passed measures forbidding the display of the red flag or any other symbol or emblem calculated to excite hostility or violence to the government. In 1921, the Legislature provided for a State Board of Aviation; created a State Board of Control and Budget Commission, and made provision for the Americanization of the foreign-born. It adopted, subject to approval by the people, which was thereafter given, optional cash or loan bonuses to veterans of the War. In 1923 the Legislature passed an income tax law and an eight-hour law for lumber workers. It also established a Judicial Council with the Chief Justice as chairman. At this session measures were passed against the holding of land by aliens, and a law was enacted requiring voters to be able to read and write English. The sale of narcotics was made a felony.

OREGON, UNIVERSITY OF. A coeducational State institution at Eugene and Portland, Ore., founded in 1872. The Schools of Education, Physical Education and Sociology were founded between 1914 and 1924. During the period the enrollment increased from 1765 to approximately 2600, of whom 1500 were men and 1100



FROM THE ORIGINAL IN THE WORCESTER ART MUSEUM, WORCESTER, MASS.

SIR WILLIAM ORPEN
"THE COSTERMONGER"

the most severe fighting of the War. He received decorations from foreign governments and the American Distinguished Service Medal. He was appointed a member of the Public Service Commission of New York in 1922. In 1924 he conducted as counsel the investigation into the conduct of the Veterans' Bureau.

OSBURN, RAYMOND (1872–). An American zoölogist, born at Newark, Ohio, and educated at Ohio State University and Columbia University. He was instructor in biology at Starling Medical College (1898–99); professor of biology at the Fargo (N. D.) College (1899–1902), instructor at the New York High School of Commerce (1903–07); instructor in zoölogy (1907–10) and assistant professor (1910–15) at Barnard College; professor of biology at Connecticut Women's College (1915–17); and professor of zoölogy at Ohio State University (1917–). Professor Osburn published taxonomic papers on the bryozoa and was for a number of years on the investigation staff at the United States Bureau of Fisheries Laboratory at Woods Hole, Mass

O'SHAUGHNESSY, EDITH COUES (MRS. NELSON O'SHAUGHNESSY) (?–) An American writer, born in Columbia, S. C, and educated under private tutors In 1901 she married Nelson O'Shaughnessy of New York, who was in the diplomatic service. While the latter was chargé d'affaires in Mexico in 1916 she made careful notes of political and social affairs which enabled her to write *A Diplomat's Wife in Mexico,* an enlightening and entertaining account of stirring events in that country. This was followed by *Diplomatic Days in Mexico* (1917); *My Lorraine Journal* (1918); *Alsace in Rust and Gold* (1919), and *Intimate Pages of Mexican History* (1920).

OSLER, SIR WILLIAM (1849–1919). A physician and author (see VOL. XVII). During the period from 1914 to the time of his death, Dr. Osler wrote two major works, *A Concise History of Medicine* (1919) and *The Evolution of Modern Medicine* (1921). Since his demise, extracts from his works have been edited by C. N. B. Camac with the title *Counsels and Ideals* (1921). A fifth edition of the essays entitled *Æquanimitas* appeared in 1923, and the ninth edition of Osler and McCrae's *Principles and Practice of Medicine* in 1920.

OSTWALD, WILHELM (1853–). A German chemist and philosopher (see VOL. XVII). He was editor of *Der Monist* (1912–15) and later published *Der Farbenatlas* (1917); *Die Farbenlehre* (1918–19); *Die Harmonie der Farben* (1918), *Goethe, Schopenhauer, und die Farbenlehre* (1918); *Die Farbkorper* (1919); *Die Farbschule* (1919), and *Einfuhrung in die Farbenlehre* (1919) He lectured at Columbia and Harvard Universities and founded a laboratory for color study in Dresden in 1920.

OTIRA TUNNEL. See TUNNELS.

OVERMAN, LEE SLATER (1854–). An American legislator (see VOL XVII). He was reëlected to the Senate for a third term in 1914. This was the first senatorial election by a direct vote of the people of the State. In 1920 he was reëlected for a fourth term He was one of the most conspicuous of the Democratic members of the Senate

OVERTON, GRANT M(ARTIN) (1887–). An American writer, born at Patchogue, N. Y. He studied at Princeton University from 1904 to 1906 and for several years was on the staffs of newspapers in New York, Denver, and San Francisco After a trip at sea before the mast, he became an editorial writer for the New York *Sun* in 1910 and was later its literary editor and contributor to several magazines His books include *The Women Who Make Our Novels* (1918); *Mermaid* (1920); *World without End* (1921), and *The Answerer,* a novel on the life of Walt Whitman (1921)

OWEN, ROBERT LATHAM (1856–). An American legislator (see VOL XVII) and United States Senator from Oklahoma. He first took his seat in 1907 and was reëlected in 1912 and again in 1918 for the term expiring Mar. 3, 1925 He was a member of several important committees including that of appropriations, banking, and currency

OXYGEN. See CHEMISTRY.

OZONE. See CHEMISTRY.

P

PACIFIC OCEAN ISLANDS. The more important groups of islands in the Pacific Ocean are given below. For American possessions, see PHILIPPINE ISLANDS, HAWAII, GUAM, SAMOA. For the Yap agreement, see YAP. For a discussion of the political problem of the Pacific see WASHINGTON CONFERENCE.

Caroline and Pelew Islands. A group of islands in the Western Pacific, formerly part of German New Guinea, but since 1918 a Japanese mandate territory. The islands were divided into two groups (1) the Eastern Carolines with Ponapé as the centre; and (2) the Western Carolines with Yap as the centre. The population reported (1921) was made up of 644 Japanese, 14 Europeans, 15 Chinese, and about 40,000 natives Copra was the chief export See YAP for the dispute between the United States and Japan over the disposition of this island.

Cook Islands. A group in the Southern Pacific belonging to New Zealand. Total area, 280 square miles; population, in 1921, 13,209. In 1915 the laws for the islands were consolidated and a member of the New Zealand Executive Council was made minister of the Cook Islands. In 1921, imports totaled £139,313 and exports £86,082 Trade was largely with New Zealand, exports being mainly fruits. Copra was sent to the United States (£11,841 in 1921). Revenues for 1921–22 were £22,011 and expenditures £32,422. A wireless station was erected on Rarotonga, the chief island. Many of the islands were leased to private coconut companies for exploitation The Niué islands had a population of 3750 and were concerned largely with copra production (exports in 1920 were about £40,000).

Fiji Islands. A group of 250 islands in the Southern Pacific, constituting a British crown colony. The largest are Viti Levu and Vanua Levu. Total area, including Roturna (a dependency), 7038 square miles; population (1921), 157,266, made up of 3878 Europeans, 84,475 Fijians, 60,634 Indians, 910 Chinese, 2781 half-castes In attendance at the Methodist churches in 1921 were 78,944 natives. The government was aiding 50 schools out of a total 1000 on the islands In 1921, there were under cultivation by Europeans and Indian settlers 45,800 acres of coconuts, 68,500 acres of sugar cane, 11,300 acres of rice Bananas, maize, tobacco, rubber, beans, were other crops. Exports in 1913 were £1,425,940; in 1921, £2,457,-851 (sugar, £2,053,000). Imports for the same years were £903,968 and £1,509,732. The trade was carried on largely with British possessions. Revenues and expenditures for 1913 were £266,-037 and £258,792; for 1921, £569,722 and £752,-038 There was a public debt in 1922 of £350,-000 (£93,515 in 1911) Wireless telegraph stations were erected at Suava, Labasa, Taveuni, and Savusavu. The governor of Fiji was also high commissioner for the Western Pacific.

Gilbert and Ellice Islands Colony. These islands were annexed as a colony to Great Britain in November, 1915. The Gilbert Islands are on the equator and have an area of 166 square miles, and a population of 30,000. The Ellice Islands have an area of 14 square miles, and a population of 3500 Ocean Island, the colony headquarters, had a population of 1000. A wireless station here maintained telegraph communication with the outside world via Fiji and Australia The very rich phosphate deposits on the island were, after 1921, worked by the British Phosphate Commission. Other islands in the colony were the Union or Tokelau group, and the American Islands. Of the latter, Christmas Island was the largest atoll in the Pacific. It was leased in 1914 to the Pacific Coconut Plantations, Ltd., for exploitation; population, 2 Europeans and 40 Tahitians Fanning and Washington Islands, also in this group, were being worked by a coconut company. Total revenues for the whole colony for 1920–21 were £54,079 and expenditures £45,380. The trade in 1919–20 amounted to £129,788 for imports and £213,042 for exports (phosphates, £158,751; copra, £54,010).

Marianne or Ladrone Islands. A group of islands in the Western Pacific, formerly part of German New Guinea, but since 1918 a Japanese mandate territory. Native population numbered 3368 and the Japanese, 1754. Guam (q.v.), the largest island, belonged to the United States

Marquesas Islands. A group of islands in the Western Pacific belonging to France and administered from Papeete. Total area, 480 square miles; population, 2300, of whom 168 were white. Hivaoa and Nukahiva were the principal islands.

Marshall Islands. A group of islands in the Western Pacific, formerly part of German New Guinea, but since 1918 a Japanese mandate territory The group is made up of two chains, viz., Ratack (13 islands) and Ralick (11 islands). The population consisted of 102 Japanese, 5 Europeans, and 8901 natives. Coconut-palm plantations covered 1275 hectares, and the chief export was copra

Nauru. An island in the Western Pacific just south of the equator, formerly part of German New Guinea, but since 1920 administered by Great Britain under a mandate from the League of Nations. It is a circular atoll only 12 miles in circumference. Population in 1922: 110 Europeans, 514 Chinese, 1113 Nauruans, 392 other South Sea Islanders. The important phosphate deposits were placed in the hands of the British Phosphate Commission representing the governments of Great Britain, Australia, and New Zealand. Costs of administration, if ordinary revenues did not suffice, were to be met out of the phosphate sales. Phosphate exports increased from 101,267 tons in 1917 to 236,435 tons in 1921. Imports were

valued at £140,302 in 1921. Of the phosphate mined a royalty of sixpence per ton went to the Commission and a royalty of threepence to the native landowners. Of the latter, one penny per ton was paid into a trust fund held for all the Nauruans. The German wireless station, though dismantled by the Germans, was soon restored The island fell in September, 1914, before a British naval force and from 1915 on was occupied by a civil administration.

New Caledonia. A French colony in the Western Pacific consisting of the island of New Caledonia (area, 7650 square miles) and four groups of island dependencies. Population (1921), 47,500, made up of 13,138 free settlers, 5671 of convict origin, and 28,075 Melanesians and Polynesians. Nouméa, the capital, had 10,053 inhabitants of whom 6502 were free (1921). Leading products were nickel, chrome iron. manganese and cobalt (mineral export in 1921, 5,527,160 francs), as well as copra, hides, and preserved meats. Local blast furnaces produced 4486 tons of nickel valued at 5,819,300 francs. Total exports for 1913, 1920, 1921 were 15,838,405 francs, 43,043,449 francs, 26,676,000 francs. Imports for 1921 were 48,565,000 francs France, on an average, took 8 per cent of the exports and sent 18 per cent of the imports. The budget for 1922 balanced at 8,831,925 francs. The Loyalty Islands, which belong to this group, possessed rich guano deposits; on the Wallis and Horn Islands, copra was the leading product. The latter were formed into a colony in 1913.

New Hebrides. These were administered jointly by French and British officials. Area, 5500 square miles; population (1921), 60,000, of whom 677 were French and 226 British. Several French and British trading companies operated here. Imports in 1920 were £159,174; exports (maize, copra, coffee, cotton, sandalwood, cocoa), £245,187. The French reported a total trade of 13,051,527 francs in 1921, of which 9,768,625 francs represented the French activities and 3,282,802 francs the British. Intercourse was mainly with Sydney and Nouméa (New Caledonia) The joint revenues in 1921 amounted to £25,892, and the joint expenditures, £18,947. Ownership of land was divided as follows: French, 617,000 hectares; British, 129,000 hectares. Beginning with 1919 the islands became the seat of a strong agitation for the termination of the condominium (1906) and accession by France. The question was discussed at the British Imperial Conference in 1921, and again later in the year, when an offer was made by a French private company to buy out the British rights. Complaints were frequent, particularly over the cumbersome methods of administrating justice However, the condominium was renewed by the protocol of London on Mar. 18, 1922.

Norfolk Island. An island in the Southern Pacific, a dependency of Australia. Area, 13 square miles; population (1921) 717. Up to 1914 it was governed from New South Wales. Imports in 1920–21 were £22,673 and exports £13,091. To encourage the fish industry the Commonwealth granted an annual subsidy of £1000 (for three years).

Phœnix Group. This was made up of eight islands with a total area of 16 square miles, and a population of 59. They belonged to Great Britain but were leased to a trading company for coconut planting.

Samoa. A group of islands in the Western Pacific, formerly a German possession, but since 1920 administered by New Zealand under a mandate from the League of Nations. The group, comprising the large islands of Savaii and Upolu and several adjacent islets, was given the name Territory of Western Samoa. Area, about 1300 square miles; population (1922), 2074 Europeans, 33,953 native Samoans, 1547 coolie laborers, 217 other islanders Education was in the hands of the London Missionary Society, the Methodist Mission, the Catholic Mission, and the Latter Day Saints' Mission. Imports for 1921 were £408,892 and exports £241,539 (copra and cocoa beans largely). Revenues for 1921–22 were £135,569 and expenditures £137,181. The United States took most of the copra exported. New Zealand forces occupied the islands on Aug. 29, 1914 In 1918, 7500 natives died from influenza, the region being one of those that suffered most severely. A wireless station was erected at Apia, the Territory's port. The local administration made provision for a nominated legislative council in which native Samoans might have seats. For the American Samoan islands, see article SAMOA.

Society Islands. A group in the Western Pacific belonging to France. Total area, 1650 square kilometers; population, 21,543. Tahiti, the most important island, has an area of 1042 square kilometers, and a population of 11,378, of whom 2903 were white. Papeete, on Tahiti, was the seat of administration of the French Establishments in Oceania, and possessed a wireless station. It had 4601 inhabitants of whom 2126 were white. The chief industries of Tahiti were the preparation of copra, sugar, and rum. Vanilla, coffee, and cacao were again being cultivated. Other islands belonging to the Society group were Moorea (area, 132 square kilometers; pop., 1616) and Iles-sous-le-Vent (area, 363 square kilometers; pop. 6689).

All the French Establishments (i.e Society Islands, Marquesas, Tuamotu, and Tubua groups) had a total area of 4395 square kilometers, and a population in 1921 of 31,655, made up of 2655 French, 2687 other whites, 743 Chinese, and the rest natives Leading exports were copra, mother-of-pearl, hides, coconut oil, phosphates, coffee, vanilla, cotton Exports in 1913, 1920, 1921 were valued at 11,554,507 francs, 24,360,900 francs; and 15,000,000 francs Imports in 1921 were 14,210,000 francs. In 1920 only 4 per cent of the imports came from France, and only 6 per cent of the exports went to the mother country. The budget for 1922 balanced at 6,500,000 francs; in 1911 it had been 1,745,000 francs Some 5000 lives were lost in these islands in the influenza epidemic of 1918.

Solomon Islands. A British protectorate in 8°S. and 160°W., made up of 15 large islands and the following groups: Lord Howe group, Santa Cruz Islands, Mitre Islands, and the Duff or Wilson group. Total area, 11,000 square miles; European population (1919), 675; native population, 150,000; Asiatics, 75. Coconuts were cultivated over 30,000 acres; other products were rubber, fruits, copra (8160 tons in 1919–20). Imports for 1921–22 were £251,564; exports (mainly copra), £182,887. Revenues for 1921–22 were £56,433; expenditures, £45,451. The islands in the group owned by Germany became part of the Australian mandate territory of New Guinea (q.v.) after the War.

Tonga or Friendly Islands. A group of

islands in the Western Pacific, forming a British protectorate. Total area, 385 square miles; population (1919 estimate), 23,562, made up of 22,689 Tongans, 250 half-castes, 247 other Pacific islanders, 376 Europeans The natives were Christians, belonging to the Free Church of Tonga, Methodist, and Catholic Churches. Copra was the chief product, more than half of it going to the United States. Imports and exports each averaged £170,000 after the War. Exports in 1920 amounted to £380,157. Revenues in 1920–21 totaled £91,000 and expenditures £66,000 A wireless station at Nukualofa was in touch with Samoa and Fiji. The reigning sovereign, Queen Salote, came to the throne in 1918.

Tuamotu Islands. A group in the Western Pacific belonging to France and administered from Papeete. Total area, 55 square kilometers; population, 2378, of whom 82 were white. Makatéa, the principal island, had important phosphate deposits In the Gambier Islands, pearls and mother-of-pearl were the leading products.

Tubuai Islands. A group in the Western Pacific belonging to France and administered from Papeete Area, 124 square kilometers; population, 2301, of whom 66 were white. Coffee was being grown here.

PACK, CHARLES LATHROP (1857–). An American forester and economist, born at Lexington, Mich , and educated in the public schools at Cleveland He studied forestry in Germany. For several years he explored forests in Canada, the Northwest, Louisiana, and Mississippi He was a director and official in many important financial institutions and from 1917 to 1919 president of the National War Garden Commission. He was president also of the American Forestry Association from 1916 to 1920 and of the National Conservation Congress in 1913. He was chairman of the French Agricultural Committee of the American Commission for devastated France. For his services in France he was awarded several medals He wrote much on agricultural subjects, including *The War Garden Victorious*, *Memorial Trees*, and *Roads of Remembrance*.

PACKING INDUSTRY. See LIVE STOCK.

PADELFORD, FREDERICK MORGAN (1875–). An American educator, born at Haverhill, Mass , and educated at Colby College, Yale, and Oxford He was for one year a fellow at Yale and from 1889 to 1901 was professor of English at the University of Idaho In the latter year he became professor of English at the University of Washington, and in 1920 dean of the Graduate School at that university. He was a member of several societies and author of *Old English Musical Terms* (1900); *Early Sixteenth Century Lyrics* (1906); *Samuel Osborne, Janitor* (1913); *George Dana Boardman Pepper, a Biographical Sketch* (1914); and *The Poems of Henry Howard, Earl of Surrey* (1920). He also translated and edited many English texts and contributed to *The Cambridge History of English Literature* and to European and American magazines

PADEREWSKI, IGNACE JAN (1860–). A Polish pianist and composer (see VOL XVII). On May 9, 1917, he made at the Metropolitan Opera House, on the occasion of a gala performance in honor of General Joffre, his farewell appearance, which he declared was to close forever his pianistic career. He then plunged into the midst of the political turmoil. At the beginning of the War and after, he had appeared at his concerts also as a political orator of no mean ability and contributed the greater part of the proceeds to the cause of Poland. After 1917 he devoted his entire time and energy to recruiting from among the Poles in the United States an army of 100,000 men and 50 officers, which subsequently constituted the greater part of the Polish Army in France. As soon as circumstances permitted, he went personally to Poland (1918), where he became the leader of the Conservative party and was largely instrumental in organizing the new Polish Republic, of which he became Premier and Minister of Foreign Affairs (Jan. 26, 1919) In this capacity he took active part in the Peace Conference at Versailles. The unsettled conditions in Poland brought about the downfall of the cabinet in December, 1919; and Paderewski, his health seriously impaired by the stress of events, retired to his estate at Paso Robles (California) Here, however, he kept in close touch with the political situation of his native country As he had sacrificed the greater part of his fortune to the cause of Poland, he found himself compelled to rescind the resolution regarding his artistic career, and on Nov. 22, 1922, he reappeared amidst scenes of indescribable enthusiasm at a recital in New York. Fortunately for art, he continued his distinguished artistic career and proved that the intervening five years of political excitement had not in the least impaired his supreme mastery See POLAND, *History*

PAGE, HERMAN (1866–). An American bishop, born at Boston, and educated at Harvard and at the Episcopal Theological School In 1891 he was ordained a priest in the Protestant Episcopal Church and until 1900 was in charge of mission churches in Idaho. He was rector of St. Paul's Church in Chicago from 1900 to 1914 and was consecrated bishop of Spokane, Wash , in 1914 He became bishop of Michigan in 1923

PAGE, THOMAS NELSON (1853–1922). An American writer and diplomat (see VOL. XVII). He was appointed ambassador to Italy by President Wilson in 1913 and served in that position through the difficult period of the War, until 1919 His conduct in this office did much to continue and increase the good feeling between the Italian and American governments His later books include *The Land of the Spirit* (1913) *and Italy and the World War* (1920).

PAGE, WALTER HINES (1855–1918) An American publisher, writer, and diplomat (see VOL. XVII). In 1913 he was appointed ambassador to Great Britain His strong and frankly expressed sympathy with the English attitude during the years in which he held this post made him a popular figure in England. Much of his time, as indicated in his letters, was spent in convincing President Wilson and the officers of his government of the necessity of taking a more aggressive attitude and in favor of the Allies During his ambassadorship, he won high praise in all quarters by the tact which he displayed and his skill in dealing with delicate and complicated problems His strength was unable to withstand the strain imposed on him, and he returned to the United States very ill, in 1918 He resigned his post in 1918 and returned to the United States, where he died on December 22. His *Life and Letters*, published in 1923, is one of the most illuminating records of

the events of 1914 to 1918 in international politics.

PAGE, WILLIAM HERBERT (1868–). An American lawyer and educator, born at Mount Union, Ohio, and educated at Yale University and the law department of Ohio State University, where he was professor of law from 1896 to 1917. In the latter year he assumed a like position at the University of Wisconsin. His many writings on legal subjects included *Page on Wills* (1901), *Page's Ohio Digest* (1914); and *Compact Code* (1921).

PAHANG. See MALAY STATES, FEDERATED.

PAINE, ALBERT BIGELOW (1861–). An American author and editor (see VOL. XVII). His later writings include: *The Boy's Life of Mark Twain* (1916); *Mark Twain's Letters* (1917); *George Fisher Baker, a Biography* (1919); *A Short Life of Mark Twain* (1920); *The Car That Went Abroad* (1921); and *In One Man's Life* (1921).

PAINLEVÉ, PAUL (1863–). A French statesman and scientist (see VOL. XVII). In October, 1915, he was appointed Minister of Instruction and Inventions affecting national defense, in the Briand cabinet. He later succeeded General Galliéni as Minister of War. He was also a member of the War Committee and from September to December, 1917, Prime Minister and Minister of War. As Minister of War he was accused by the supporters of General Nivelle (q.v.) of having interfered with the French offensive of April, 1917. In 1920 he was appointed advisory director general of Chinese government railways. He was the author of several scientific books and *A Life of Nurse Cavell.*

PAINTING. The history of painting from 1914 to 1924 was a continuation of the struggle which became acute during the first decade of the twentieth century, between the movement known as modernism, or post-impressionism, or, better still, as expressionism, and impressionism and other more conservative factors in painting. The years of the War almost completely checked artistic production in Europe except in so far as it could be drafted into war service, and most of this war painting was propaganda rather than art. At the end of the War the situation was very much the same as in 1914, and the struggle was still continuing in 1924. Painters were concerned with studying the means of artistic production rather than with producing real works of art. Many theories were expounded and still more pictures put on canvas to demonstrate them, but relatively little of real value had been created. It was the threshold of a new epoch, but what the result would be no one could tell. One encouraging sign was that painters of the new tendencies were so much concerned with expression, with the inner truth, with the essence rather than with the mere aspect of nature. On the other hand, these same men often did inexcusable violence to the aspect of nature.

France. By the end of the first decade of the twentieth century impressionism had conquered its rivals, realism and other academic tendencies, and had become dominant in official as well as in artistic circles. From 1913–21 Paul Albert Besnard (1849–), an impressionist painter, was head of the Ecole de France à Rome and after 1922 director of the national Ecole des Beaux Arts at Paris. It was he above all others who applied the impressionist technique to mural painting. He was highly successful also as a portrait painter of women. Among other decorators of note were Jules Cheret, who united impressionism with the tradition of Fragonard; Henri Martin (1860–), the painter of Languedoc; and Aman-Jean (1860–). Most mural painters, however, never fully accepted impressionism. Among painters affected by it, Lucien Simon, with an admixture of realism, painted homely scenes; Charles Cottet, Parisian society. The chief pioneers of impressionism had for the most part passed on, Dégas in 1917, Renoir in 1919, both active and developing till the end: Claude Monet was still painting his scintillating landscapes. Among the younger men of strict impressionistic technique were Albert André, who is the best in still life; Maufra, Moiret, and Casals for Spanish subjects.

Great as were the achievements of impressionism, it had a serious defect which induced a speedy reaction. Concerned only with the representation of light, with the appearance of things, it had no inner life and lacked the gift of psychology. The various modernist movements therefore insisted on expressionism, i.e. that the painting should not so much represent nature itself as the painter's reaction towards nature, the emotions roused in him by the object depicted. This led to the rejection of nature as a norm. Rejecting also the flat surfaces of impressionism, the post-impressionists strove for solidity and structure. Design should be organized and not haphazard, as it is in nature; color and form symbolic, rather than realistic. One form of this reaction was symbolism, which presents nature in a symbolic as distinct from the actual form. Its foremost exponent was the delightful pastellist and illustrator, Odillon Redon (1840–1916). The group included such staunch modernists as Paul Serusier, Maurice Denis, Pierre Bonnard, and Edouard Vuillard. The art of the first two is mystic and religious, while that of the others is decorative; Vuillard especially has been influenced by Japanese art. One group's reaction against impressionism consisted of imitation of Italian fifteenth century art, or what the English call Pre-Raphaelitism. Foremost among them were Félix Valloton (1865–) and Jean Frélaut (1879–), both painters of Breton subjects.

The group known as "Les Fauves" was at first made up chiefly of pupils of Gustave Morot (1826–98), a symbolist. Rejecting their master's academic tendencies, they expressed themselves with such wildness that this term, signifying "wild beasts," was applied to them. Foremost among this group was Henri Matisse (1869–), a very abstract painter who pushes simplification to the utmost, striving indeed to attain the vision of a child. Both in line, of which he is a consummate master, especially of outline, and in color, his art recalls Chinese and Japanese painting. The group included also Kees van Dongen (1877–), a Dutchman, who painted fashionable Parisian society, and Modigliani (1889–1920), an Italian, who created simply colored figures on the conventions of negro art. Others of the "Fauves" afterward developed in various directions, some becoming cubists, others following Cézanne's lead. As time went on, Cézanne became more and more the dominant influence in modernist art. His closest follower was André Derain (1880–),

an artist of great power, both in figure and landscape, whose color became increasingly severe. Another important figure was Maurice de Vlaminck (1876–), a highly dramatic landscape painter of brilliant technique. It was he who discovered negro art as revealed in the wooden fetishes of the African savages, carved before their association with white men. Here was an art of pure plastic quality, simplified to the utmost, abstract in form, and with very remote resemblance to actuality. It greatly influenced the new movement, especially cubism. Among other artists once classed among the "Fauves" who were affected by cubism were Albert Marquet (1875–), Othon Friesz (1879–), Jean Marchand (1883–), and Segonzak (1884–). There was at the close of this period an increasing tendency among them to use forms based on nature rather than pure abstractions. A curious outgrowth of the modernist movement was feminism in painting. There have been women painters at all epochs, but their art has not differed materially from that of men. The art of Marie Laurencin, subtle in design, exquisite in color, is essentially feminine in spirit and conception, such as no man could have produced. That of Elizabeth Fuss-Amoré is very rich in color, subtly personal and feminine.

As a reaction against the flat surfaces of impressionism, cubism is concerned particularly with the expression of bulk and solidity. This it does by means of colored cubes and cylinders, following the dictum of Cézanne: "Nature can be expressed by the cube, the cone, and the cylinder. Any one who can paint these simple forms can paint nature." It is an art of organized space, linear form, movement, and color, dissociated from the actual appearance of things. The influences which contributed to its formation were Cézanne, Seurat, and especially negro and Polynesian sculpture. Matisse gave it its name and aided at its formation in 1908, but the real founder and leader had been and still was Pablo Picasso (1881–), a Spanish sculptor. He was the author of its conventions, such as the guitar, clay pipe, the bottle of alcohol, printed letters, etc. He has well been called "the chameleon artist," as he has worked in many different manners, with cubism as a phase of his development. His color, at first sombre, had finally become frank and clear. Georges Bracque was the purist of the group, a logical, rigid cubist; Fernand Leger represented the mechanical aspect. Albert Gleize, a facile writer on cubism, was painting in two rather than three dimensions, while Jean Metzinger was an orthodox cubist of the cylinder and cube variety Among other followers of the movement in 1924 were Auguste Herbin, André L'Hote, half cubist, half realist; Jacques Villon; Marcel Duchamps, and François Picabia. Two poets, Guillaume Apollinaire and André Salmon, belonged to the cubist group and wrote in its interest. The influence of cubism, wide and in many respects wholesome, was in the direction of solidity and expression. Many painters in different lands experimented with and to some extent adopted it. But in its rigid form cubism seemed at the close of the period to be on the wane. Picasso's latest works were more representative, under the influence of Ingres.

There had latterly been many secessions from cubism, mostly ephemeral, such as Orphism and synchronism, which are concerned with arrangements of color irrespective of volume or actuality, and Dadaism, founded in Switzerland in 1917, by Tzarra, a Rumanian. This form of presentation, which had followers in France and Germany, clears away the past and is satirical in character, better adapted to cartoons than to paintings.

Italy. A later and more radical movement, futurism, forms Italy's peculiar contribution to modernism. It began as a protest of a band of young writers, painters, and sculptors that their country was nothing more than a vast museum of the past. Unlike the other modernists, the futurists break utterly with the past and look only toward the future; hence their name. The function of painting as they see it is to represent movement and growth, the dynamic forces of modern life. Many of their paintings bear the title "Dynamics" of this or that subject. As their manifesto puts it: "We must make a clean sweep of all hackneyed subjects and express henceforth the whirlwind life of our day, dominated by steel, egotism, feverish activity, and speed." This they often seek to accomplish by means not unlike cubism, combining in the canvas not only what the artist sees but all he knows about the subject. A typical futurist feature is the use of so-called "force lines," certain linear rhythms whose convergence or divergence convey to the artist the dominant thought or emotion he wishes to express. Color is purely arbitrary and may be used to heighten the effect. So may all manner of extraneous objects, which are simply pasted onto the picture. Futurist art indeed is cinematographic, except that it tries to show all at once what the moving-picture unfolds in a given space of time.

The founder of the movement was the poet Marinetti, who wrote its eloquent manifestoes From 1910, when their first exhibition was held at Milan, to 1924, Luigi Russolo represented futurism in its most logical form. Umberto Boccioni, also a sculptor, was an able theorist on æsthetics, whose paintings are often of interesting design. Gino Severini was the illustrator of futurism, Carlo Carrà its most genuine painter, who, unlike the others, uses gay color Giacomo Balla's work is merely pretty. Many of the cubists were influenced by futurism and experimented with it, and vice versa. It had won but few new disciples and seemed destined to decline

Great Britain. The latest effusion of modernism, vorticism, is a product of conservative Great Britain; but before examining it a brief survey of recent British art should be made. Although the chief influence was French, impressionism in its pure form never played a great part in Great Britain. It was rather the modified form of early impressionism, as introduced by the American Whistler during his long residence in London, which prevailed. This was concerned rather with decorative and tonal effects than with the pure study of light, especially in the case of the Glasgow school, out of which came Sir John Lavery (1856–), especially known as a portraitist. The methods of the brilliant Irish painter, Sir William Orpen (1878–), are more akin to impressionism, while Augustus John, a Welshman (1876–), in his powerful characterizations, tends rather to modernism. Mention should also be made of two Americans, active in London, John Singer Sargent (1856–), whose superb technique

combined realism with impressionism, and James J. Shannon (1862–1923), whose illustrative art ranges him properly among British painters. Frank Brangwyn (1867–) represents rather the realistic point of view in his recent superb decorations for the Panama-Pacific Exposition and the Missouri State Capitol. The powerful individual landscapes of P. Wilson Steer show a transition from impressionist to modernist technique. An important figure in the introduction of French post-impressionism into England was Roger Fry, especially by his writings and exquisite connoisseurship. It was mainly the influence of Cézanne and Van Gogh that made itself felt, and the aim was greater plastic effect but with more reference to nature than in France Among the leaders were Spencer F. Gore (1878–1914) and Harold Gilman (1876–1919), who tended more strongly toward modernism, and Charles Ginner.

According to the theory of vorticism, "every concept, every emotion presents itself to the vivid consciousness in some primary form. It belongs to the art of this form." The "vortex" is the artist's faculty through which the emotions and conceptions pass to take concrete shape on canvas. Through it they pass from the general to the concrete. In common with post-impressionists, vorticists do not reject the work of the past; but they agree with the futurists that modern art should reflect present-day industrial civilization, with its dominance by the machine Their paintings are in general geometric and abstract, not unlike cubism. Their aim is to purify painting, and they rely especially on the primary pigment of their art, resembling in this regard the Orphists and synchronists There was nothing essentially new and original in their art, which began in 1913, although several interesting painters had taken it up The founder and principal leader was Wyndham Lewis (1884–), with whom were associated Cuthbert Hamilton, Frederick Etchels, Edward Wadsworth, and William Roberts. The poet of vorticism was an American, Ezra Pound; the sculptor was Henry Gaudier-Brzeska (1891–1915). Vorticism was also a passing phase in the development of C. R. W. Nevinson, who experimented in other styles, including cubism and futurism, only to return in his later work to a more conservative academic art.

During the War the British government made the interesting experiment of employing several painters at the front, and many of their pictures were purchased by the Imperial War Museum. Most of the men employed were actually engaged in warfare and so painted from experience as well as observation. In the choice of artists a wise eclecticism was followed; not only accepted academicians but the most radical groups were included. And it was just these radicals whose art seemed especially adapted to the mechanical character of modern warfare. Among the most prolific of war painters was Sir William Orpen, a major in the army, whose portraits of the chief commanding officers are well known; James McBey, official painter of the army of the Near East; George Clausen, and Augustus John, who painted important commissions for the Canadian government. The futurist technique of C. R. W. Nevinson grappled most successfully with searchlights, shells, and especially aëroplanes. Paul Nash, a visionary post-impressionist, depicted what might be called nature's "dance of death," while vorticism, through its leaders, Wyndham Lewis and William P. Roberts, showed itself well capable of representing the dynamics of modern warfare. All these artists wisely confined themselves to episodes of warfare and did not attempt battle paintings on a grand scale. One of the few good results of the War was the destruction of the old-fashioned battle picture, with its photographic detail, most characteristically seen in the works of Meissonier. The modern battle extending along a front of many miles cannot be painted. The brave array of soldiers has been replaced by the invisible crowds of the trenches. The brightly colored uniforms are now sombre browns, grays, and greens, and the modern soldier is little different in aspect from a workman. (See *War Paintings and Drawings*, by British artists, New York, 1919; and Charles Holme, *The War Depicted by Distinguished British Artists*, in *The International Studio*, 1918).

Germany. The War and the succeeding years levied a heavy death toll on the painters of Germany. At the close of the decade 1914–24, many of the older men were still active in the manner of their earlier work· Edward Gebhardt, religious painter, at Düsseldorf; Arthur Kampf, realist, at Berlin, and Max Liebermann, chief representative of impressionism and leader of the North German secessionists, also in Berlin. In Munich the "Decorative School," led by Franz Stuck, was somewhat akin to modernism in its realistic representation of mystic and allegorical subjects inaugurated by Böcklin. But even this was in 1924 considered conservative and official. Impressionism was an importation which never secured a firm foothold in Germany The native tendency was all toward its antipode, expressionism, for which the soil was well prepared by earlier painters In the early sixteenth century Matthias Grunewald distorted nature to express emotional mysticism much as El Greco did later in Spain. Hans von Marées (1837–87), rebelling against realism and early impressionism, sacrificed the appearance of things to volume and symbolic expression in his noble decorative figures. The Swiss Ferdinand Hodler (1853–1918), a powerful and arbitrary painter, developed in his later works a thoroughgoing expressionism. The influence of Cézanne, Van Gogh, and to a less extent Gauguin was early felt in Germany. But it was an exhibition of the works of the Norwegian Edvard Münch in Berlin which caused the separation of the new movement from the Berlin Secession. Cubism and futurism never obtained an important following, for the principal German tendency was toward forms of purer expressionism. There were two chief groups, at Berlin and Munich. The former group was the less radical. The facile and decorative art of Max Pechstein is more akin to the post-impressionism of other lands, and so is that of Albert Werszgerber and Carl Caspar, all of whom were influenced by Cézanne. Among the members of a more radical group at Berlin called "Die Brücke" were E. L. Kirchner, its founder, a visionary who changes city scenes into fairyland; Erich Heckel, a painter of landscapes romantic in subject; Karl Schmidt-Rottluff, whose tendency is to the colossal and even brutal; and Otto Müller, who prefers rather lyric subjects, painted in tempera.

At Munich, Russian artists contributed to produce the most radical type of expressionism. Foremost among them was Wassily Kandinsky (1886–), a theorist who writes as well as

he paints. He maintains that the rhythm of line and color and of color in juxtaposition to color should be built up architecturally, on fixed principles of construction, as in music. Such an art appeals to the eye independently of all representation, very much as music affects the ear. His pictures are arrangements of abstract line and color without attempt to represent nature. It was he who with a few others seceded from the other post-impressionists to form the group called, from its publication, "Der Blaue Reiter" An important member of this group was Franz Mark (1880–1916), who painted impressions of animals in symbolic color. Others are Heinrich Camperdonck, whose quaint presentations of village and other subjects are essentially imaginary and unreal; Burljuk, a Russian; Baroness Werefkin, Auguste Macke, Gabriel Munter, and Adolf Block. Mention should also be made of Oskar Kokoschka (1866–), an Austrian painter, the most radical of all, less abstract, but equally eccentric, and powerful to the point of brutality; and also of Emil Nolde and Karl Hofer, who paint in a similar vein.

Russia. At the outbreak of the War the Russian school of painting was of great importance and promise. Two factors contributed to make it unlike any other school: stage decoration and peasant art The unparalleled success of the Russian ballet in Europe and America was due as much to its artistic settings as to superb dancing. Of unprecedented power and imagination, these decorations were all the work of Russian painters. Diaghilev, one of the St. Petersburg group, was the pioneer and the greatest painter-impresario in dramatic history. Other great designers were the painters Benois, Golovine, Léon Bakst, Anisfeld, and Larianov. The astonishing freedom of presentation in modern Russian painting and its highly imaginative and decorative qualities were due largely to this training. It was also profoundly affected by the pure, bright color schemes and the picturesque settings and costumes of native peasant art, and on its imaginative side by a vital school of book illustration, particularly of folk tales and subjects The most important reaction against the realism of the Wanderers, chief of whom was Ilya Repin, was the "Mir Iskousstva" (Artistic World) at St. Petersburg. Unlike the former, which painted Russian contemporary life, this group sought subjects in the past, was cosmopolitan in character, and showed French influence Alexander Benois chose the age of Louis XIV in France and that of Elizabeth in Russia, Constantine Somov, the period of 1830; Nicholas Roerich, the Viking age The Moscow group was less learned and more pictorial and chose Russian subjects. Its best-known representatives are Igor Grabar, a *pointilliste*, to-day an influential figure in Soviet Russia, and especially Maliavin, who depicted the gay, animal side of the Russian moujik.

Meanwhile various modernist tendencies had appeared in Russia, and their influence was beginning to be felt. The War put a stop to painting, and during the revolution and the years following most of the artists emigrated from Russia, chiefly because the wealthy class which patronized art had ceased to exist. They migrated to different centres, many joining the large Russian artistic colony in Paris, where they maintained their vital national art. An exhibition of their works was shown at various places in the United States in 1924. The exiles included Fechin, a pupil of Repin, Choukhaiev, Jakolev, Sorin, a rather conservative portraitist, Soudeikin, Stelletski, Burliuk, and especially Boris Grigoriev, whose apocalyptic hallucinations of the Bolshevist revolution and representations of the Russian populace, particularly on their brutal and bestial side, caused a sensation. Best known in the United States was Boris Anisfeld (q.v.), who exhibited repeatedly in New York and elsewhere. In Russia itself the Revolution wrought little damage to existing art works. The more important public museums, like the Hermitage in St. Petersburg and the Tretikov Gallery in Moscow, were greatly enriched by the confiscation of private collections; and the Imperial and other important palaces were transformed into museums. Throughout the length and breadth of the land new museums were established The successful management of public art institutions, which was conceded to be better than ever before, was due to the efforts of Lunacharski, minister of public instruction. One of the daring schemes of Soviet Russia was the establishment of a new proletarian art. Rejecting cubism and futurism as bourgeois products, they acclaimed a new art, "suprematism," which denied not only all representation but even the stylization of natural forms Kandinsky, whose art most approached this norm, was called from Munich to aid in its establishment as well as that of the provincial museums. The only official exhibition of Bolshevist paintings held outside of Russia was at Berlin in 1923. It was about the most modern exhibition ever seen The paintings were usually labeled "constructions" or "compositions" and were built up mathematically. Simplification went even beyond Kandinsky's in the works of such men as Malevitch and Robchenko. Everywhere the search for new forms of art was in evidence. There were also many works of a more conventional character, and the impression of the whole was that of a living and vital art of telling forms and splendid color. Whether such modernist paintings fulfilled the requirements of a Soviet art as enunciated by Kamenev, "an art comprehensible to workmen and to peasants," is another question. In subject it was indeed proletarian, but representation was confined almost to posters and black and whites

Other European Countries. The virile national impressionism of Sweden suffered great loss in the death of its two chief representatives, Anders Zorn (1860–1920) and Carl Larsson (1853–1919). Liliefors was still the chief painter of wild animals, and Gustav Fjaestad was painting fine snow and water scenes in *pointilliste* technique. Zorn's successor in painting the Danecarlian peasantry was Mas Olle, another good portraitist. Sweden had also its due proportion of modernists, such as Axel Törneman; Gabriel Strandberg, who painted the outcasts of Stockholm; John Bauer, whose quaint imagination found expression in fairy tales; and Ossian Elgström, with a touch of the Laplander.

The dominant figure in Norwegian art until his death was Edvard Münch, who was also something of a modernist, influenced somewhat by Cézanne. His successor was Ludvig Karsten. The foremost talent of the neo-impressionist group was Hendric Lund, while Sören Ansorger was known for his nudes. Norway also had its



FROM KATHERINE S. DREIER COLLECTION NEW YORK

JOSEPH STELLA—"BROOKLYN BRIDGE"



FROM THE METROPOLITAN MUSEUM OF ART, NEW YORK

ERNEST LAWSON—"WINTER SCENE"

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Belgium and Holland were strongly affected by the new movement, especially Holland. In a country which had in its art been so closely attached to the past and realistic in character, it was astonishing to what extent the new movement had spread. Although Van Gogh, one of its chief pioneers, was a Dutchman, his last and most radical works were wrought in France, and his influence entered Holland quite late; nevertheless it was powerful Among the chief representatives of the new development were Jan Toorup, Thorn-Prikker, Willem van Konijnburg, J. J. Isaakson, and Jan Sluyters.

The death of Sorolla in 1923 removed the foremost representative of impressionism in Spain. The most interesting manifestation of contemporary Spanish painting was the nationalist school of the North, founded by Zuloaga and ably seconded by numerous followers, including the Zubiaurre brothers. In subject and treatment it was thoroughly national and continued the traditions of El Greco and Goya. It was decorative in style, with heavy outlines, rich, sombre color and vivacious expression.

United States. During the years 1914–24, American painting followed a normal development, less changed by recent radical tendencies than other important schools It was also less affected by the War. During the early years of the conflict artistic production was in no wise curtailed, and it was not until after the entry of the United States in 1917 that there was any perceptible diminution in the output. There was comparatively little painting of war subjects. The death toll among older American artists during the period was heavy. To mention a few of the most prominent, William Merritt Chase and Thomas Eakins died in 1916; Albert Ryder and Carroll Beckwith in 1917; Henry Golden Dearth in 1918; C. Y. Turner, Frank Duveneck (q.v.), Ralph A. Blakelock, James Alden Weir, and Kenyon Cox in 1919; Abbott H. Thayer and J. Francis Murphy in 1921; Hamilton Easter Field in 1922, Elihu Vedder, Joseph R. Decamp, Max Bohm, Paul Cornoyer, and George W. Maynard in 1923. The former radicals of the Society of American Artists were the conservatives of the day, and even those of the next younger generation were now among the elect. All these continued their work, and many figured at the exhibitions and as medalists, such as Douglas Volk, Irving Wiles, Dewitt Lockwood, Cecilia Beaux, Mary Cassatt, Frank Benson, and Edmund C. Tarbell, among portraitists and figure painters; Waugh, Woodbury, and Emil Carlsen as marine painters, the last especially taking many medals in the later years for marines and still life; Edward Redfield, Elmer Schofield, and Gardner Symonds, as painters of winter subjects; and Childe Hassam (q.v.), the most pronounced impressionist among the older men.

Arthur B. Davies, (q.v.), known as leader of the modernists, continued his idyllic subjects with no end of variety and charm. In the years following 1913 he passed through a cubist period, which added volume and construction to his rather decorative art. So also did Robert Henri (q.v.), whose virile production and influence continued almost undiminished. Of his former pupils, George Bellows achieved great distinction through his bold and powerful portrait and figure subjects, which won medal after medal. Other important members of this group were George Luks, William Glackens, John Sloan, and Eugene Speicher. Powerful alike in characterization and technique are the portraits of Leopold Seiffert of Philadelphia. Other portraitists known also as figure painters were John C. Johansen, Karl Anderson, Joseph Pearson, Jean M. Lane, Louis Betts, Leon Kroll, and Henry R. Rittenberg, a fine painter of still life. In the first rank of American figure painters was Charles W. Hawthorne (q.v.), who paints the inner life with beautiful and highly characteristic color. Of pronounced impressionistic technique among the younger men were Richard Miller, Frederick Frieseke, and James Weiland. Mention should also be made of a characteristic branch of American painting, i.e. Indian subjects. The Taos group of painters, so called from their place of residence in New Mexico, in recent years painted many interesting representations of Indians, chiefly of the Southwest. Among their number were Julius Rolshoven, Carl Rungius, Walter Ufer, Ernest L. Blumenschein, Edward Potthast, and O. E. Berninghaus. Their work was generally impressionistic or realistic in character and of fine illustrative quality. In this connection the landscapes of Albert Groll (q.v), the painter of the mesas and the desert landscape, should be recorded. Among painters devoted chiefly to decorative work were Violet Oakley, whose mural decorations of the Pennsylvania State House at Harrisburg attracted wide attention; Robert Chanler, whose specialty was screens showing Chinese influence but independent and modernistic in conception and execution; Hugo Ballin, and Arthur Crisp. Landscape painters among the younger generation were many. One of the strongest was Ernest Lawson, whose winter scenes are particularly fine. These subjects were preferred also by John Folinsbee and Charles Rosen, who in the later years became modernistic in tendency. Jonas Lie was painting landscapes as well as great industrial scenes, and Gifford Beal brightly colored landscapes, while Guy Wiggins was more tonal. Among the marine painters Paul Dougherty painted the Maine coast and William Ritschel the Pacific, while Hayley Lever was known especially for his boats, though he later painted other varieties of landscape with equal ability

After the entry of the United States into the War, there was considerable activity among American painters in designing posters, especially in aid of the government loans. Many war pictures, intended to fire patriotic endeavor and represent important episodes of the War, were also painted. Among the most interesting of these was a series depicting Fifth Avenue in war time by Childe Hassam. An important series of war portraits, authorized by the National Art Commission and paid for by subscriptions in the principal cities of the United States, was presented to the National Museum at Washington. Exhibited at the Metropolitan Museum in New York City in 1921, they were all by painters of conservative tendencies. The most important was a large picture, "Signing of the Treaty of Versailles," by John C. Johansen. The remainder were portraits of the chief war celebrities of all the Allies by Cecilia Beaux, Jean McLane, Joseph

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Decamp, Charles Hopkinson, Edmund C. Tarbell, Douglas Volk, and Irving R. Wiles. Another important series consisting of portraits of Americans prominently identified with the War, and also presented to the National Museum, was donated by a Norwegian, in gratitude for his own financial benefits during the War. Several of these were painted by J. H. von Rehling-Quistgaard, an American painter of Danish extraction, the remainder by artists chosen by a committee of experts.

The brilliant success with which modernism was launched in New York City and Chicago in 1913 gave great promise for the future of the movement. But this promise was not realized. Factional differences soon dissolved the International Association of Painters and Sculptors, which had organized the exhibition; and beyond separate exhibitions of smaller groups, little was heard of the new painting. In 1917 the Society of Independent Artists was founded with unrestricted membership to any one paying the nominal initiation fee. Each member is entitled to send a limited number of paintings or sculptures to the annual exhibition. As there was no jury of acceptance and the paintings were hung in alphabetical order of authorship, these exhibitions presented a strange medley of pictures excellent and worthless, academic and modernist. Nevertheless they formed an open forum, uncontrolled by official juries, for the radicals. Their most interesting feature in the later years was the work of a group of native Indian artists, without technical training and therefore modernist enough. Their chief subjects were Indian ceremonial dances, painted in pure, bright water-color. Modernist paintings were constantly on exhibition in numerous private galleries, and in New York they found a special home in the Société Anonyme's Museum of Modern Art, founded for this purpose. Among painters of distinctive modernist tendencies were Rockwell Kent (q.v.), especially in his Labrador subjects; Kenneth Hayes Miller, of much influence as a teacher; Maurice Sterne and Max Weber, both admirable teachers; Andrew Dasburg, a follower of Cézanne, Samuel Halpert and Henry McFee; Walter Pach, a cubist still-life painter; Abraham Walkowitz, William Zorach, and most important of all, John Marin, whose admirable landscapes and water-colors were accepted in all circles. Of more radical tendencies were John Covert, A S. Baylinson, Marsden Hartley, Man Ray, S. McDonald Wright, Morgan Russell, Jay Van Everen, James Daugherty, Henry Fitch Taylor, and Katherine S. Dreier, who is chiefly known as a writer and the founder of the Société Anonyme. The foremost representative of futurism in the United States was Joseph Stella, who with rare ability depicted Brooklyn Bridge, the subway, and other characteristic features of New York.

Bibliography. Consult: W. H. Wright, *Modern Painting* (New York, 1916); Charles Marriott, *Modern Movements in Painting* (London, 1920); Roger Fry, *Vision and Design* (ib., 1920); André Salmon, *L'Art Vivant* (Paris, 1920); Gustave Coquiot, *Les Indépendants* (ib., 1920); Max Deri, *Die Neue Malerei* (Leipzig, 1921); Clive Bell, *Since Cézanne* (New York, 1922); Katherine S. Dreier, *Western Art and the New Era* (ib., 1923); L. M. Bryant, *American Pictures and Their Painters* (ib., 1923); Louis Réau, *L'Art Russe* (Paris, 1922); Carl Laurin and others, *Scandinavian Art* (New York, 1922); F. M. Huebner, *Die Neue Malerei in Holland* (Leipzig, 1921).

PALACHE, Charles (1869–). An American mineralogist, born at San Francisco, Cal., and educated at the University of California. In 1896 he became instructor in mineralogy at Harvard, where he has since remained, attaining professional rank in 1912. His many scientific papers related chiefly to mineralogy and particularly to the crystallography and paragenesis of American minerals.

PALÆONTOLOGY. See Anthropology.

PALÉOLOGUE, Maurice Georges (1859–). A French diplomat and man of letters, educated at the Lycée Henri IV in Paris. He entered the French diplomatic service, was secretary at Tangiers and at Rome, and was sent on special missions to Germany, Korea, and Belgium. He was assistant director of the Foreign Office and was appointed ambassador to Russia; this post he held during the War and afterward returned to the Quai d'Orsay On the resignation of Berthellot as director general of the Foreign Office, Paléologue succeeded him. As a writer of varied interests, Paléologue published essays, biographies, memoirs, and archæological studies. His memoirs on *La Russie des Czars pendant la Grande Guerre* (1921) throw a vivid light on the decomposition of the Russian Empire under the stress of the War. His other works include *Vauvenargues*, crowned by the French Academy (1889), *Alfred de Vigny* (1892); *L'Art Chinois* (1888), *Profil de Femmes* (1895); *Sur les Runes* (1897); *Le Calice* (1901); *Rome: Impressions d'Histoire et d'Art* (1902); *La Cravache* (1904), and *Le Point d'Honneur* (1907).

PALESTINE. A British mandate territory and the Jewish national homeland, since July 1, 1920, under a civil administration It includes that part of historic Palestine which lies to the west of the Jordan and which before the War was a vilayet of the Turkish province of Syria. Area, estimated at 9000 square miles. The population, according to the census of Oct 23, 1922, was 757,182, comprising 590,890 Moslems, 83,794 Jews, 73,020 Christians, 7028 Druses, 163 Samaritans, and 265 Bahais. The capital, Jerusalem, had a population of 62,578 Other principal cities are (population in parentheses): Jaffa (47,709), Haifa (24,634), Gaza (17,480), Hebron (16,577), Nablus (15,947). Jewish immigration, which was resumed after the War, totaled 27,000 by Mar. 1, 1923. Jaffa was the principal port of entry; the immigrants came largely from Poland, Russia, Morocco, Austria, Syria, Bulgaria, Rumania, Egypt, Hungary, etc Moslem interests were represented by a Supreme Moslem Council; Jewish interests were the concern of the Palestine Zionist executive.

Jewish Colonies. These colonies, totaling 80 in number, were grouped in four districts, viz. Judea (26), Samaria (17), Lower Galilee (27), Upper Galilee (10). The colony possesses schools, synagogues, public libraries, hospitals, and baths. By the end of 1923 the total population of these colonies numbered more than 20,000 and the lands which they worked included some 160,000 acres. The colonies were owned or established by the Jewish National Fund, the Palestine Land Development Company, Baron Edmund de Rothschild, and the Jewish Colonization Association. Tel Aviv, near Java,

founded by Jewish colonists in 1909, had a population estimated at 15,000 to 20,000. Its real estate had an assessed value of $12,000,000. In June, 1923, a £E75,000 loan for municipal improvements was floated in New York.

Education. In 1924 there were the following government schools: 45 town schools, 267 village schools. The Christian and Jewish children attended non-government schools. Christian schools numbered 163 (13,500 pupils), the Jewish schools, 175 (18,000 pupils). There were Jewish high schools at Jerusalem and Jaffa, three teachers' training colleges, schools of music at Jerusalem, Jaffa, and Haifa, and a technical college at Haifa. In all these, Hebrew was the medium of instruction. The majority of the non-government schools were receiving state aid

Industry. The productive portion of the country is the narrow strip of plain running along the Mediterranean from Gaza to Haifa. The richest region, in the neighborhood of Jaffa, was developed by Jewish colonists who carried orange and lemon cultivation here to a high degree of production. The acreage of the Jewish plantations included 3750 acres of vineyards, 8456 acres of almond groves, 3330 acres of orange groves, and 1500 acres of eucalyptus In 1922–23, crop production was: wheat, 79,798 tons; barley, 32,079 tons, durra, 21,555 tons; olives, 14,000 tons; lentils, 3908 tons There was in the country the following live stock: 262,000 sheep, 483,000 goats, 19,000 camels, 12,000 buffaloes. Under the direction of an agriculture department, expert advice was rendered in matters pertaining to plant diseases, fisheries, forestry, meteorology, etc. Mineral resources included sulphur, iron, coal, salt, limestone, sandstone, and gypsum. The government was applying itself to reforestation and the reclaiming of the sand-dunes. Trade, carried on largely through the ports of Jaffa, Haifa, and Gaza, continued to show an unfavorable balance over the period 1919–23. Imports for 1919–20 and 1922–23 totaled £E4,191,060 and £E5,428,146; exports for the same years were £E733,443 and £E1,376,649. The chief articles of export were oranges, soap, melons, wine, apricot paste, and almonds; the chief articles of import were cottons, cigarettes, sugar, petroleum, and rice The principal countries of origin in 1922–23 were Great Britain and the United States, with Egypt, France, Italy, and India next in order Experts went to Egypt, the United States, and Great Britain.

Finance. For the year 1923–24, receipts were estimated at £E1,787,200, divided into £E535,000 customs, £E130,000 house and land tax, £E40,000 animal tax, £E200,000 tithes, £E43,000 stamp duties, £E48,000 excise duties, £E42,000 land registry fees, £E415,000 railways, £E112,900 posts and telegraphs. Generally, the budgets balanced in the years following the War

Railways. There were in operation in 1923 604 miles of railways, of which 479 miles were being operated by the government of Palestine, and 125 miles by the Palestine Railways for the British Air Ministry. The most important lines were the Kantara-Haifa (259.5 miles), Jaffa-Jerusalem (54.2 miles), Rafa-Beersheba (37 miles).

Government. By the constitution of Sept. 1, 1922, executive power was vested in the High Commissioner, appointed by Great Britain. A legislative council, of 10 official members and 12 unofficial, of which at least two were to be Christians and two Jews, was given the power to legislate for the mandate territory. The High Commissioner might veto any ordinance, or the British government might disallow it. By 1924 the Legislative Council had not yet been convened because of the abstention of the Arabs from the polls. The Jews chose an elected assembly, which in turn appointed a national committee to treat with the Palestine government. The British mandate for Palestine was approved by the League of Nations Council on July 24, 1922, and was promulgated on Sept 29, 1923. On July 1, 1920, Sir Herbert L. Samuel became High Commissioner. See also JEWS AND JUDAISM; ZIONISM

History. The home of the ancient Jewish kingdom, Holy Land of the Christians, which had been subject to Mohammedan rule since the failure of mediæval crusades to establish an enduring Christian government, entered upon a new phase of its checkered history in 1917, when it was wrested from the Ottoman Empire by British and Arab invaders. That Palestine would be among the spoils to be divided by the victors had been anticipated By the secret Sykes-Picot Agreement of May 16, 1916, France and England had agreed that the ports of Haifa and Akka should be assigned to Britain, and that Palestine as a whole should be "separated from Turkish territory and subjected to a special régime to be determined by agreement between Russia, France, and England." Not content with this somewhat ambiguous pledge, the British government skillfully manœuvred to obtain sole jurisdiction over the region. Of fundamental importance in this British move was the celebrated Balfour Declaration of Nov. 2, 1917. This highly important utterance pledged the British government to "establishment in Palestine of a National Home for the Jewish People, . . . it being clearly understood that nothing shall be done which may prejudice the civil and religious rights of existing non-Jewish communities in Palestine or the rights and the political status enjoyed by Jews in any other country." The British policy set forth in the Declaration proceeded from two fundamental motives. As a war measure the Declaration was calculated to win the international Jewry to the cause of the Entente Of much greater importance, however, was the knowledge that Palestine had been from time immemorial the connecting link between Mesopotamia and Egypt and that it is the strategic point which potentially controls the road to India by land and by sea. The establishment of a Zionist state under British protection gave Great Britain this priceless and coveted possession, and, while it cemented the foundations of the British Empire, homage was done at the same time thereby to the Allied slogan of "self-determination of nations." The British project, a superb combination of altruism and imperial *Realpolitik*, had unfortunately some serious drawbacks which had been left out of consideration, namely the fact that modern Palestine was not a Jewish country, and secondly the ever-growing opposition of Arab nationalism, of which Great Britain itself had been the chief instigator. Moreover, the British had overlooked a very important factor. Palestine is not only the natural link between Mesopotamia to the northeast and Egypt to the southwest, but it also lies at the mouth of the great Arab reservoir of man power to the south,

whence the Arabs had poured forth since the earliest days into the neighboring regions. The attempt to close this outlet by an artificial Jewish state under the protection of the British Empire was naturally fraught with danger, and all the more so since the Balfour Declaration conflicted, in the opinion of the Arabs at any rate, with the British commitments to the Sherif of Mecca in 1914 and 1915.

When Palestine was wrested from the Turks it was in an exhausted condition. The land was untilled and production had fallen to a low ebb. The population had decreased considerably during the War and the whole system of civil government had fallen to pieces. Immediately after the occupation the British set up a military administration which after much effort succeeded in bringing about an improvement. Gradually cultivation was restored and normal life began to return. But much more had to be accomplished. Palestine, a country with a variety of soils and climates, had always been undeveloped and underpopulated under Turkish rule, and the British aim was to bring out the great latent fertility of the country. As for the Jewish population, which had been very small during the 19th century and had risen to about 100,000 before the War, it formed in 1918 only a fraction of a total population which was predominantly Arabic-speaking and, if not entirely Arab in racial composition, at least claimed to be Arab.

On Sept. 27, 1919, Zionism, which had been a force in the Jewish world for some time before the War, pleaded its case before the Supreme Council and asked for the recognition of the historic title of the Jews to Palestine and for the right to reëstablish there a national home. Furthermore, they requested that the sovereign possession of Palestine be vested in the League of Nations and that Great Britain as a mandatory of the League be empowered to govern the country. After a long delay, during which the first manifestations of Arab national sentiment against this proposed settlement occurred, the Supreme Council at the Conference of San Remo, Apr. 25, 1920, granted the mandate to Great Britain and in July of the same year the military administration was replaced by a civil régime under Sir Herbert Samuel, a prominent English Jew, as High Commissioner. In October, 1920, an Advisory Council was set up, consisting of ten officials of the administration, four Moslems, three Christians and three Jews. Much attention was given to local government and 22 municipalities and 14 local village councils were established. As for education, the Turkish system was reorganized and extended The Moslem children attended the government schools where Arabic was the principal medium of instruction, but most of the Jewish children went to schools conducted by the Zionist Organization and the Christian children attended the schools maintained by the ecclesiastical and charitable bodies. Considerable progress was made in the direction of public health and sanitation, which had been very low under the Turkish régime. The law of the land was in substance that of the Turkish Code. The abolition of the Capitulations, which had been decreed by Turkey at the outbreak of the War, was maintained, except in the case of the United States. Foreigners were tried by a British magistrate or by a court with a majority of British judges. Public security was maintained by a police force and gendarmerie recruited from all sections of the population.

The Zionist claims to Palestine were recognized in the Peace Treaty of Sèvres, and the Balfour Declaration was incorporated in the text of that document After much contention between the English and the French over the boundaries between Palestine and Syria a convention defining these was signed on Dec. 23, 1920. A final agreement relative thereto was concluded on Feb. 3, 1922. The draft for the Palestine mandate was submitted to the League of Nations on Dec. 7, 1920, and approved in July, 1922. Its promulgation was delayed, however, due to the opposition of the Italians to the French Syrian mandate with which the Palestine mandate was bound up The mandate realized practically all the demands of the Zionists at the Paris Conference in 1919. The region to the east, known as Transjordania (q.v.), was under the authority of the High Commissioner, but enjoyed a special status and was not included in the area of the Jewish National Home. Subsequently Abdullah, son of the King of the Hedjaz, was established as Emir of this region.

Meanwhile the nationalist sentiment of the Arab majority, which had received a powerful stimulus in consequence of the events of the War, chafed against the arrangements for a Jewish National Home. Serious riots took place in Jerusalem in April, 1920. In February, 1921, a congress of the Palestinian Arabs was held, at which protests were registered against the Balfour Declaration and demands were made for a national government and a legislative assembly to be elected by the Arabic-speaking population residing in the country before the War. A permanent committee was set up whose purpose it was to work in this direction. On May 1, 1921, the extreme anti-Jewish feeling manifested itself in widespread disturbances in the course of which military force had to be employed to restore peace. This led to a thorough investigation of the affairs in Palestine by a commission, in the report of which the Arab grievances were analyzed and both sides were exhorted to refrain from all expression of extremism and to work in a spirit of moderation for a lasting understanding and for the development of the country. But the report upheld the policy of the Balfour Declaration and said nothing which could serve to allay the apprehensions of the Arabs In order to settle the grave difficulties, the British government drafted a constitution for Palestine, the chief provisions of which were given to the press in February, 1922. According to this document supreme executive authority was to be vested in the High Commissioner, who was to be assisted by an Executive Council. Provision was made for the establishment of a Legislative Council, to consist of 10 officials and 12 unofficial members, the latter to be elected under a system of primary and secondary elections. The acts of the Legislative Council were to require the assent of the High Commissioner or in certain cases that of the British government. In regard to the judicial system, provision was made for the setting up of separate Moslem, Christian, and Jewish religious courts with English, Arabic, and Hebrew as the official languages. The British government was to be the arbiter in complaints regarding nonfulfillment of the terms of the mandate, but the procedure in such cases was to be prescribed by the League of Nations.

After the publication of the draft of the Constitution, a delegation, claiming to represent the entire Christian-Moslem population of Palestine, went to England to protest against the provisions. The chief complaint of the Arabs centred on the limited self-government which was to be bestowed on Palestine under the Constitution and it was claimed that such restriction was contrary to Article 22 of the Covenant of the League of Nations. The reply of the British government made clear that a different course and in particular the establishment of a national government was not open to Great Britain since this would have involved an abandonment of the Balfour Declaration and the pledge regarding a Jewish National Home. The British, in fact, could not repudiate the policy of the Balfour Declaration if they wished to retain their hold on Palestine, the possession of which was so invaluable for the safeguarding of the British Empire. In view of the powerful possibilities inherent in Arab nationalism, it was doubtful indeed whether an Arab Palestine would have been as pliable an instrument in British hands as a Jewish Palestine was. The Palestinian Arabs, on the other hand, responding to the virile movement of Arab nationalism, could not very well recede from their position of opposition to Zionist rule in view of the fact that the Jews constituted only a fraction of the total population of Palestine. According to the figures of the official census of 1922, which divided the population along religious lines, the total population in that year was 755,000, composed as follows: Moslems, 589,564; Christians, 73,026; Jews, 83,794; Druses, 7028; other religions, 1446. Most of the Christians spoke Arabic, were racially akin to the Arabs, and sided with the latter against the Jews. A serious consideration in this connection was the fact that a Zionist Palestine was a direct challenge to that still obscure but nevertheless potent revolt against Western civilization which was slowly crystallizing in post-war Pan-Islamism. Arab nationalism could be regarded in many aspects as the advance guard of this movement which involved a new form of the Moslem faith and as such stood for a social and cultural conception which was opposed to the West.

A lengthy declaration of the British policy, issued in July, 1922, attempted to allay the apprehensions of the Arabs. It referred to these as "partly based upon exaggerated interpretations of the meaning . . . of a Jewish National Home in Palestine" and stated at the same time that the Balfour Declaration was "not susceptible of change." While the Zionist Organization declared itself satisfied with this declaration, the Arab delegation refused to accept it and returned home in the fall of 1922. Thereupon the Arabs decided to boycott the elections for the Legislative Council which were held in the beginning of 1923. Since this boycott precluded the creation of a legislative body representative of the majority of the people, the British government suspended for the time being the part of the Constitution dealing with the Legislative Council and restored the Advisory Council which was to have been abandoned under the Constitution. This new Advisory Council, which was to consist of eight Moslems, two Christian Arabs, and two Jews, was, however, impossible of formation, because, under pressure from the Nationalists and particularly from the Arab delegation which had recently returned from London, most of the prospective members refused to serve on it. Meanwhile Palestine had become filled with rumors of an agreement between Great Britain and the King of the Hedjaz under which Palestine was to become part of the domain of the latter. In spite of the Palestine government's denial of the truth of these rumors, considerable excitement ensued and the Sixth Palestine Arab Congress, which met in June, 1923, found it necessary, in view of the conflicting opinions prevailing among Moslems, Christians, and Jews, to declare that it was opposed to any such course. After the Congress, another delegation was sent to London, which soon returned, its mission having been a complete failure. The confirmation in 1923 by the League of Nations of the British mandate for Palestine and the consequent legalization of the existing status failed to impress the Arab population, which continued its intransigent attitude. The government's offer for the creation of an Arab Agency similar to the Jewish Agency meeting the adamant opposition of the Arabs, the government proceeded to form an Advisory Council consisting of officials only. At the same time a new moderate Arab Liberal party sprang into existence, which, in spite of its opposition to the old party, failed to evince much moderation in its programme. The year 1923 was marked by a final settlement of the frontiers of Palestine and Syria through agreement between the mandatory powers and by Great Britain's recognition of Abdullah's Transjordanian government as an independent state, although Transjordania (q.v.) remained in fact a British protectorate and was subsequently protected, during an uprising, by British military force. See also ARABIA; CALIPHATE; PAN-ISLAMISM. TRANSJORDANIA.

PALMER, A(LEXANDER) MITCHELL (1872–). An American lawyer and public official, born in Moosehead, Pa., and educated at Swarthmore College. After studying law, he was admitted to the bar and practiced for several years in Stroudsburg, Pa. He was a member of Congress from 1909 to 1915 and in the latter year was appointed judge of the United States Court of Claims. This post he resigned after a few months. He was appointed Alien Property Custodian in 1917 and served until 1919, when he was appointed Attorney General of the United States in President Wilson's Cabinet. He was prominently mentioned as a presidential candidate in 1920. Following his retirement from political life, he resumed the practice of law.

PALMER, FREDERICK (1873–). An American author and war correspondent, born at Pleasantville, Pa., and educated at Allegheny College. From 1895 to 1897 he was a newspaper correspondent in London. As a war correspondent he witnessed the Greek War in 1897. During the Spanish-American War he was in the Philippines and accompanied the expedition for the relief of Peking, China, in 1900. Other campaigns in which he was correspondent were those in Central America and in Macedonia in 1903. He was also a correspondent in the Russo-Japanese War and accompanied the American Battleship Fleet in its round-the-world cruise (1907–08). He investigated conditions in Central America in 1908–09 and witnessed the Turkish revolution in 1909 and the Balkan War of 1912. From 1914 to 1916 he was accredited correspondent of the American press with the British army and fleet and in 1917 was commis-

sioned major and lieutenant-colonel in the United States Army Signal Reserve Corps. His writings include *Going to War in Greece* (1897); *The Ways of the Service* (1901); *Central America and Its Problems* (1910); *My Year of the War* (1915); *My Second Year of the War* (1917); *America in France* (1918); *Our Greatest Battle* (1919); and *The Folly of Nations* (1921).

PALMGREN, SELIM (1878–). A Finnish composer, born at Björneborg. After graduating from the Helsingfors Conservatory he continued his pianistic studies in Berlin with Ansorge, Berger, and Busoni. He was conductor of a choral society in Helsingfors from 1902 to 1904 and in 1909–12 conducted the orchestral concerts of the Music Society in Abo. He has appeared extensively as a concert pianist and guest conductor in Finland and Scandinavia. In 1909 he married the famous Finnish soprano, Maikki Pakarinen. In 1921–22 both artists made a very successful tour of the United States. Palmgren's compositions are original and beautiful music and yet conform to established standards. He wrote two operas, *Daniel Hjort* (Helsingfors, 1910) and *Peter Schlemihl* (not produced); a symphonic poem, *Floden;* incidental music to *Tukkimo;* three concertos for piano and orchestra, and songs and male choruses. Special mention should be made of his compositions for piano solo, which show his genius at its best and deserve to rank with similar works of Grieg.

PAN-AFRICAN MOVEMENT. See AFRICA.

PANAMA. A Central American country situated between Colombia and Costa Rica. Area, 32,380 square miles; population, census of 1923, 446,098. a gain of 29 per cent over 1910. The Canal Zone (not included in the above) had 71,682 inhabitants in 1911 and 22,858 in 1920. Panama, the capital, had, in 1920, 59,458 (37,505 in 1911); Colon, 31,203 (17,748 in 1911). In the 339 government public schools, 35,255 children were in attendance in 1922. In 1911, a national college, the Instituto Nacional, was erected

Industry and Trade. Only a small area continued to be cultivated. The leading crops were: bananas, coffee, cacao, caoutchouc. Sugar was beginning to take on importance, the production in 1922 being 6,055,700 pounds, and consumption, 8,000,000. Tobacco, too, was becoming prominent. As a result of the extensive cattle-rearing, the export of hides was large. In 1905, there were 65,000 cattle; 200,000 in 1916, and 300,000 in 1922. The trade, during the decade 1914–24, showed little increase except for 1920, which was the country's most prosperous year. Imports totaled $17,561,994, almost 50 per cent greater than those of 1913. But because of the ensuing depression, the imports dropped to $11,372,370 for 1921, and $10,220,168 for 1922. In 1912, the United States supplied 53.7 per cent of the imports, Great Britain 24.1 per cent, Germany 10.9 per cent. In 1920, the proportions were: United States, 76 per cent; Great Britain, 6.3 per cent. In 1922, they were: United States, 68.4 per cent; Great Britain, 9.2 per cent. Exports, by comparison, were worth much less. In 1913 they totaled $5,383,028; for 1920, $3,552,166; for 1921, $2,495,407, and for 1922, $2,487,478. In 1921, the United States took 93 per cent of the total value, and in 1922, 87 per cent. Bananas annually accounted for more than half the exports. Others were: coconuts, balata, hides, gum, sugar. Principal imports were: cotton, iron, steel, flour. All the international commerce of Panama moved through the ports of Colon, Panama City, and Cristobal and Balboa in the Canal Zone.

Finance. The finances, reorganized by an American fiscal agent, were based on a biennial budget. For the period 1913 and 1914 the budget balanced at $7,682,428. For 1922, revenues were $5,299,999 and expenditures $6,900,217. The foreign debt at the beginning of 1922 was $2,671,680. In 1923 a loan of $4,500,000 was floated in New York for highway construction and the development of the country's resources. This was secured by the income from the $6,000,000 which Panama had invested in New York City real estate after the Canal Zone purchase.

History. The constitution, as amended Dec. 26, 1918, provides for a president directly elected and ineligible as his own successor, and a directly elected chamber of deputies. The provincial governors are also to be popularly chosen. Presidents for the period were: 1912–16, Belisario Porras; 1916–20, Ramon M. Valdez (died), Ciro L. Urriola; 1920–24, Belisario Porras. By the treaty between Colombia and the United States (finally ratified in 1921) the former recognized Panama's independence. Panama, having been an Associated Power in the War, became an original member of the League of Nations Panama's continued refusal to accept the White decision (1914) in respect to her boundary dispute with Costa Rica led troops of the latter to seize the town of Coto on Feb. 28, 1921. The danger of general hostilities caused the United States to offer its good offices, which both sides accepted on March 9. The United States insisted that the White award be accepted, and Panama, still protesting, was compelled to withdraw her troops from Coto. In 1922, the Hay-Bunau-Varilla treaty of 1903 with the United States was the subject of discussion in Washington, the purpose being the removal of those causes of friction under which Panama had chafed for two decades. These included property valuations for the Canal Zone, a free port, docking privileges, etc. In 1924, negotiations were begun for the revision of the Taft agreements of 1924 regarding the Canal Zone

PANAMA CANAL. This great engineering work was opened to traffic Aug. 15, 1914, and since that time has proved an ever-increasing factor in the commerce of the world It is used by ships of practically all nations having merchant shipping and has served to reduce materially the time and cost of transportation from one continent to another. The canal was opened in 1914 notwithstanding the fact that in the latter part of 1913 there had been serious earth slides in Culebra Cut, and on Oct 13, 1914, navigation was seriously interfered with until the material could be dredged out These slides have occurred from time to time and cut off traffic from September, 1915, until Mar. 27, 1916; but since that time, with constant dredging and a careful study of local conditions, it has been possible to keep the canal open to traffic.

As the canal found increased use, docks, warehouses, and repair facilities were provided at either end, and the harbors were dredged to give access for the largest vessels using the canal. Fortifications protecting the canal and

its works were constructed, and every effort was made to secure its maintenance and operation on an economical and efficient basis. In fact, it was not many years before the canal more than paid all operating costs, and while this did not take into consideration the overhead and the interest on the original outlay, yet it prevented the canal from being a burden to the nation The cost of the Panama Canal up to the end of the fiscal year ending June 30, 1915, including the balance of appropriations still on hand and available for work in progress, was $357,436,048, from which should be deducted receipts from the sale of construction material and equipment and the value of buildings and plant turned over to the United States Army and the Alaska Railways Additional expense was of course involved for government sanitation, payment to the Panama government, etc , but the sum mentioned covered the actual cost of the project See UNITED STATES

The growing use of the Panama Canal is indicated by the accompanying table and particularly by the statement that during the calendar year 1923, 5037 commercial vessels passed through the canal, a greater number than in any previous year These vessels had an aggregate net tonnage, Panama Canal measurement, of 24,737,437, carried 25,160,545 tons of cargo, and paid $22,966,838.18 in tolls

Calendar year	No of ships	Panama Canal net tonnage	Tolls	Tons of cargo
1914 [a]	350	1 281 293	$1,508,737.56	1,758,625
1915 [b]	1,154	3 902 592	4,297 467 11	4,893,422
1916 [b]	1 217	3 817 704	3 671,162 68	4,774,822
1917	1 960	6 217,054	6,107,696 63	7,443,610
1918	2,070	6 409 886	6 317,455 39	7,284,159
1919	2,133	6 943 087	6,973,095 30	7,477 945
1920	2 814	10 378 265	10 295,362 21	11,236,119
1921	2 783	11 435,811	11 261 098 80	10,707 005
1922	2 997	12 997 573	12 573 407 77	13 710,556
1923	5 037	24 737 137	22,966 838 18	25 160,545
Total	22 515	88 118 702	85 972 321 63	94,446,808

[a] Canal opened to traffic Aug 15, 1914
[b] Canal closed about three months by slides

A total of 2714 vessels made the transit of the Canal from the Atlantic to the Pacific as compared with 2323 from the Pacific to the Atlantic. In tolls $11 534 023 was collected on vessels passing from the Atlantic to the Pacific as compared with $11,432,815 57 on vessels from the Pacific to the Atlantic.

An important development was the increasing use of the Panama Canal for the transportation of petroleum by tank vessels (see PETROLEUM), for the most part loaded on the coast of California. During the calendar year 1923, 1704 of the tank ships with a tonnage of 10,079,921 net tons passed through the Panama Canal, paying $8,967,647 41 tolls, and carrying 9,625,714 tons of cargo This was 33 8 per cent of the total number of transits during the year, 40 74 per cent of the total Panama net tonnage, 39 08 per cent of the tolls collected, and 38.25 per cent of the cargo carried through the Canal. Of these vessels 869 were laden and 835 were in ballast. Of the former, 804 made the transit from the Pacific to the Atlantic and 65 from the Atlantic to the Pacific, while 812 vessels in ballast went from the Atlantic to the Pacific and 23 from the Pacific to the Atlantic. In 1922 the Panama net tonnage of tank ships passing through the Canal was 1,557,931 tons, with a cargo of 1,423,695 tons, as compared with 10,079,921 Panama net tons and 9,625,714 tons of cargo in 1923, increases of 647 per cent and 676 per cent respectively. See COLOMBIA, *History*.

PANAMA CANAL TOLLS ACT. See UNITED STATES, *History*.

PAN-AMERICAN CONFERENCES. The Fourth Pan-American Conference, held in Buenos Aires July 1–Aug 30, 1910, closed its sessions without deciding on the seat of the Conference to be held during 1914. Later, in 1913, the direction of the Pan-American Union chose Santiago in Chile as the meeting place of the fifth Pan-American Conference, but due to the outbreak of the War in 1914 the Conference was postponed indefinitely Finally, in 1922, it was decided to hold the Conference in the City of Santiago during 1923 Meanwhile, in the interval between the Fourth and the Fifth Conferences numerous manifestations of Pan-Americanism occurred Thus the Second Pan-American Scientific Congress, which was in session at Washington during the three weeks following Dec. 25, 1915, appointed an International High Commission which met during 1916 The two Financial Conferences which met in Washington in 1915 and in 1920 dealt primarily with questions of public finance and with the monetary and banking situation in Pan-America and resulted in the creation in each country of a Financial High Commission, presided over by the respective minister of finance At the Conference of the Pan-American Federation of Labor in Laredo, Texas, in November, 1918, which was attended by delegates from the United States, Mexico, and Central America, a permanent federation was organized. Two Pan-American Child Welfare Congresses were held in Montevideo in December, 1918, and in May, 1919, at the second of which provisions were made for the establishment of an International Bureau of Child Welfare. The Second Pan-American Commercial Conference was in session in Washington during June, 1919.

The Fifth Pan-American Conference opened at Santiago on Mar. 26, 1923, and closed on May 11 after a session as to the results of which there is wide divergence of opinion. All American countries were represented, except Canada, which lacked "sovereignty," Mexico, which at the time was not "recognized" by the United States, and Peru and Bolivia, which refused to attend because of their differences with Chile The 18 subjects on the agenda were divided into the large groups disarmament, political coöperation, coöperation in commerce, hygiene, education, agriculture, etc. The most vital question by far was the disarmament problem, which concerned chiefly Argentina, Brazil, and Chile, since the United States was covered by the Washington Arms Pact and the other Latin American countries had only insignificant armament. If the chief object of the Conference was the fostering of closer relations between the states of the American continent, no such end was attained as far as the A B C States were concerned, inasmuch as the negotiations on disarmament resulted only in deepening the already existing discord between them. No satisfactory agreement was reached due to differences between Argentina and Brazil, each of which accused the other of aggressive aims and insisted on her own pacific intentions While the Conference thus ended in ill feeling between the A B C States, it was not necessarily the total failure which it has been regarded in many

circles, for the disarmament question was only one out of 18 subjects before the Conference.

Under the heading "political coöperation" the most important topic under discussion was the plan for the formation of an American League of Nations for which there seemed to be strong sentiment among the Latin American delegates. Two methods were projected to accomplish this, namely, the creation of a new association of the American states and the enlargement of the Pan-American Union which was the *ad interim* Executive Committee functioning in the interval between the Pan-American Conferences. The Latin Americans were able to wrest an important concession from the United States with respect to the composition of the governing board of the Pan-American Union. Hitherto this board had been composed of the diplomatic representatives of the American states in Washington and of the United States Secretary of State as permanent president Latin Americans considered this system highly disadvantageous to them since thereby membership was restricted to countries enjoying American approval and since the representatives, due to their diplomatic status in Washington, were prevented from commenting on important problems with the necessary freedom. Hence at Santiago the composition of the governing board was attacked by the Latin American delegates with rather un-Latin bluntness After three weeks of struggle a final compromise was effected whereby it was provided that the board should, as heretofore, be composed of the diplomatic representatives of the American states in Washington and of the United States Secretary of State, but that any country not having accredited representatives in Washington, or whose representative was temporarily absent, should be free to appoint a special representative on the board. At the same time the presidency was made elective and Costa Rica's proposal for the free appointment of any person as a country's representative on the governing board was referred to the governments for study In contrast to this partial success, Uruguay's proposal to bind the American nations closer together by the formation of a compact American League of Nations was shelved by the decision to hold over the plan and to recommend it for report to the next Pan-American Conference. During the debate on this subject some of the Latin American nations, led by Colombia, made some terse statements regarding the need of defining the Monroe Doctrine. Although the United States delegation tried consistently to ignore the topic it was finally compelled, under pressure from all the Latin American delegations, to state its position, which was that the Monroe Doctrine was a unilateral doctrine for which the United States had been and must continue to be solely responsible A forward step was the revival of the commission of jurists to codify American international law, to whose next meeting, set for 1925 in Rio de Janeiro, was referred among other important matters the proposal of Costa Rica for the creation of an American Court of Justice.

Noticeable progress was made in regard to the third group of subjects on the agenda, viz., cooperation in commerce, education, hygiene, agriculture, etc. An advance was made toward the solution of the problem of the adequate protection of trade marks, a question which had been before nearly every Pan-American Conference, by an agreement which protects fully the laws and conditions of every American country and provides a simple way for the registering of trade-marks in every American country. The Committee on Hygiene worked out a complete programme for public health in America and reported favorably on the question of the restriction of alcoholism on the American continent. The Committee on Education recommended the holding of a Pan-American Educational Conference in Santiago in 1925 to consider the exchange of professors and students and the standardization of university courses, credits, and degrees

PAN-AMERICAN UNION. See PAN-AMERICAN CONFERENCES.

PAN-GERMANISM. The term Pan-Germanism has a twofold meaning. In a loose sense it is a term popularly employed in many countries to stigmatize what was regarded as the German policy of imperialism and aggression before and during the War. This popular application of the term to German political and economic imperialism, or Germany's policy as a world power, was strictly an outgrowth of war-psychology, stimulated by effective propaganda, and was valid only to the very limited degree to which German world policy was affected by the aims and the doctrines of the Pan-German movement. It was only this latter movement, an expression of extreme German nationalism, which with justice could be called Pan-German. This movement, which had its inception in the '80's and '90's of the last century and the nucleus of which was the Pan-German League, a numerically weak but very aggressive and vocal group, aimed at the creation of a Greater Germany—to be composed of the German Empire, Austria-Hungary, Denmark, Holland, Belgium and Switzerland—and at the absolute hegemony of this superstate on the European continent At the same time the Pan-Germans strove for world expansion, naval supremacy and an extensive colonial empire. The fundamental thesis underlying these aims was the ethnical superiority and the cultural unity of the Teutonic peoples. In the German Empire the Pan-Germans were a relatively insignificant group and at the most only an extreme nationalist minority. In the eyes of the world outside, however, and especially to such people as were only too anxious to find manifestations of this sort in Germany, the Pan-Germans were proof of the widespread existence of aggressive designs, and their vociferous clamoring assumed an importance which was entirely disproportionate to their influence on the government or on public opinion. Although the government attempted with bad success to suppress the Pan-Germans as much as possible and the latter attacked the government's policy as sadly inadequate and detrimental to Germany's true interests, Germany's opponents before and during the War represented the Pan-German fulminations to be an expression of the real German policy. Thus there arose slowly the popular conception that German imperialism was a nation-wide and government-directed Pan-German scheme. The contrast between the Pan-Germans and the German government was attested by the attempts of the latter to suppress the Pan-German publications and pamphlets immediately after the outbreak of the War.

Throughout the War the Pan-Germans stood for the application of ruthless methods of warfare, notably for the unlimited employment of the submarine, and for the most far-reaching an-

nexations. While they worked in close harmony with certain military and naval circles, they exerted little influence over the German people and met with determined opposition from the civil government. It was only due to the interminable duration of the War, the ever-increasing sacrifices, and the insufferable economic hardships resulting from the blockade that the government and public opinion were finally induced to look with favor on unrestricted submarine warfare Whatever hold Pan-German ideas had obtained on the people during the War was swept away during 1918 and after the Armistice by the democratic wave which came over Germany. The Kapp Putsch in March, 1920, a Pan-German attempt to seize power, was foiled by the determination of the workers. If later there was a revival of Pan-Germanism, it must be ascribed to the Peace Treaty of Versailles and its dismal consequences for Germany. The complete national humiliation and degradation, political and economic, which Germany experienced after 1919 produced a recrudescence of extreme nationalism, the results of which were numerous parties and organizations with Pan-German tendencies Proof of the revival of Pan-Germanism as a result of the working of the Peace Treaty were the nationalist activities in Bavaria during 1923 and the results of the elections in May, 1924, when 32 representatives of the Volkische party were elected to the Reichstag. The Volkische or National Socialist party was, in 1924, the strongest and most vocal exponent of Pan-German ideas See WAR IN EUROPE.

PAN-ISLAMISM. Pan-Islamism is a movement which aims at the bringing together of the Moslems of the world regardless of nationality. As such it is both spiritual and practical It had existed in some form or other ever since Islam first made its appearance, but entered in modern times into a more active stage under the reign of the Turkish Sultan Abdul Hamid during the nineteenth century, when it was made to serve the ends of the Turkish state Despite their free-thinking religious tendencies, the young Turks, for political reasons, adopted in 1911 a definite scheme of Pan-Islamic propaganda and worked industriously in the direction of the union of the Moslems under the leadership of Turkey The Turkish-Italian War and the Balkan Wars gave new impetus to the movement, and the Ottoman Empire received in these struggles the sympathy of all the Moslems as well as active aid from many Mohammedan quarters outside of its confines At the same time, however, Pan-Islamism in its broader sense encountered many obstacles. The Young Turks themselves, by reason of the particular character of their doctrine, were more and more drifting into Pan-Turanian (q.v) channels. The spread of nationalism in various Moslem countries like Mesopotamia and Syria was detrimental to Turkish Pan-Islamism Other Mohammedan peoples, and particularly the Arabs, while quite willing to acknowledge the religious power of the Sultan, objected to his assumption of secular power over the non-Turkish Moslems. On the whole the doctrine of Pan Islamism, as set forth by the Turks, i.e. the concerted action of all the Moslems of the world under the leadership of the Sultan at Constantinople, was rather vague and suffered from many inconsistencies, as was conclusively proved by the events of the War. When Turkey entered the War on the side of the Central Powers, the Grand Mufti issued a call to all Moslems to defend, in the *Jihad* or "Holy War," the Islamic faith against the "Infidels." The call to arms was by no means generally effective, since it was realized by many Mohammedan leaders that Turkey had entered the war as ally of infidel powers. Moreover, the loyalty of the dependencies of Great Britain, France, Russia, and Italy, or perhaps the apathy of their inhabitants to the Turkish cause, proved in most cases stronger than the incitement to religious fanaticism. Even in the Ottoman Empire itself the support was by no means encouraging. The Arabs, who had long resented the heavy hand of their Turkish overlords, revolted and by their timely aid helped the English to eliminate Turkish rule in Arabia, Mesopotamia, Palestine, and Syria. The result of this revolt was the Arabic Kingdom of the Hedjaz and the loss to Turkey of the Holy Places in defense of which the *Jihad* was to be waged. The greatest success which the Turkish "Holy War" was able to register was the rising of the Senussites, a Mohammedan sect of great power in northeastern Africa and the eastern Sahara. The *Jihad* of the Senussites was conducted for several years against the British on the western border of Egypt and in the Sudan, and against the Italians in Tripoli, but failed finally, chiefly because of the failure of the adjoining Mohammedan peoples to support the movement. In the central and east Asiatic possessions of Great Britain and Russia, and in the French possessions in Africa, the "Holy War" aroused little enthusiasm, primarily because the inhabitants of these regions were too far removed from the scene of action to take great interest in the Turkish cause and to exert themselves for a Turkish Caliph of whom they perhaps had never heard Another reason for the failure of the "Holy War" was the fact that the old-time *Jihad,* based on religious fanaticism, was an antiquated method of warfare in the twentieth century. It is no doubt true, however, that the *Jihad* and the Turkish Pan-Islamic movement succeeded in stirring up unrest in the Asiatic and African possessions of the Allies, but at no time did the situation become serious Even Afghanistan, which was pro-Turkish and anti-British in sentiment, failed to take up arms against the Allies at that time.

With the breakup of the Ottoman Empire and the rise of the new Turkish Nationalist state in Anatolia, the main driving force behind Pan-Islamism as it had been understood before and during the War disappeared The Turks had always been strangers to the greater number of the Moslem population and the Turkish Nationalists devoted their attention now to their Turanian kinsmen, many of whom were non-Moslems. Thus the Pan-Turanian movement entered into a more vigorous stage. The Arabs, on the other hand, who during and after the War had come into their own and who for historical and other reasons should have been the natural protagonists of Pan-Islamism, had since the War gone in for Arab nationalism In addition, they were divided by old tribal differences and animosities and in Arabia itself bitter feud prevented any coöperation between the King of the Hedjaz and the Wahabites, the two all-powerful factions in the country. The most conscious expression of the Pan-Islamic idea was to be found in the post-war period among the Moslems of India, the leaders of whom set afoot an active

propagandist movement and preached by word of mouth and through writings the union of the Mohammedan peoples. In spite of its apparent inertia in the last years, however, Pan-Islamism was latent in the steadily growing unrest and revolt against the West, which, without any central direction for nationalistic or imperialistic ends, had been taking shape in the Asiatic world since the Armistice. This revolt of the East against the West contained all the essential elements of Pan-Islamism, but was in character quite different from the Turkish conception of this movement. It was a spiritual creed and embodied at the same time a complete social system. In this sense it was the natural counterpart of the Western nationalistic movement and a force with which the Western Powers had to reckon. That these powers had some realization of this fact was clearly manifested by the eagerness with which Great Britain and France attempted to capture the leadership of the Pan-Islamic movement upon the abolition of the Caliphate by the Turkish Nationalists. While the situation in the Moslem world was very hazy and undefined, one thing seemed certain, namely, that Western materialism had encountered serious Islamic opposition. "The theory of the spiritual and cultural unity of Islam," said the Aga Khan, "is the foundation of its life and soul" See, also, ARABIA, CALIPHATE, PAN-TURANIANISM, TURKEY.

PAN-SERBIANISM. See WAR IN EUROPE.

PAN-TURANIANISM. The term Pan-Turanianism is usually applied to the rather loose and vague movement which aims at the awakening of a sense of racial unity among all the various peoples of supposedly Turanian stock, and, through this means, the establishment of political cohesion among these peoples. Within this wider movement Pan-Turanianism is also used to describe in a more definite sense Turkish aspirations toward the creation of a large Turanian state to be constituted of certain closely related Turanian peoples and to operate under the hegemony of the Osmanli Turks in opposition to other races alien to the Turanian stock and particularly to the expansion of the Western Powers in Asia Pan-Turanianism therefore covers a broad racial and cultural movement which strives toward Turanian racial and linguistic unity and a more concrete political movement. Although the drawing of clear lines of demarcation would be dangerous, differentiation should be made between the wider cultural or truly Pan-Turanian movement and the more concrete Pan-Turkish or Pan-Turco-Tatar movement. In spite of its 10 or more years of existence, the former is still very undefined and represents at best a hazy ideal which faces insurmountable obstacles Pan-Turanianism is distinct from Pan-Islamism, both from the Turkish variety which existed before and during the War and from the post-war movement for the religious, cultural, and social unity of the Islamic peoples. A large percentage of the Turanians are non-Moslems, and for this reason the protagonists of Pan-Turanianism were forced to substitute for the powerful appeal to religious fanaticism the less potent appeal for racial and cultural cooperation Notwithstanding this distinction and certain anti-Moslem tendencies in the wider movement, Pan-Turanianism is capable of effective coöperation with Pan-Islamism. This applies particularly to the narrower or Turkish Pan-Turanian scheme which aims at the creation of a state wherein Islam would be the dominant religion, and which in its appeal to the Moslem Turanians made effective use of the religious motive. If carried to its logical conclusion, Pan-Turanianism would clash irreconcilably with Pan-Islamism. The great obstacles in the way of a realization of the wider Pan-Turanian aims become apparent on consideration of the ethnical groups which are regarded as component parts of the all-including Turanian political and cultural combination. The Turanian family is commonly divided into five groups: (1) the Finno-Ugrians in Scandinavia, Hungary, European Russia, and Siberia; (2) the Samoyeds in northern European Russia and in northern and central Siberia; (3) the Tungus in central and eastern Siberia and Manchuria; (4) the Mongols in Mongolia and the Caucasus; (5) the Turks or Turco-Tatars on the Balkan Peninsula and in Asia Minor, the Caucasus, northern Persia, the Volga region, Russian Central Asia, Russian and Chinese Turkestan, and southwestern, eastern, and northeastern Siberia. These peoples inhabit regions stretching from the North Cape, the Danube, and the Dardanelles to the Sea of Okhotsk and the desert of Gobi. They adhere to such widely different religions as Christianity, Islam, Buddhism, and Shamanism. Although their languages form one linguistic family, they show many and wide differences. Their cultural stages range from the high European culture of the Magyars and the Finns through many variations down to the primitive level of the Samoyeds, Tungus, and Yakuts. For these reasons alone, aside from political and economic considerations, the welding together of these cultural and territorially widely separated groups into one coherent movement seemed a rather fantastic enterprise.

The more practical aspect of the Pan-Turanian movement concerns itself solely with the political and cultural union of the various peoples belonging to the Turkish or Turco-Tatar branch of the Turanian family. Since the Turco-Tatars, with the exception of the Yakuts in Siberia, inhabit contiguous stretches of territory from Rumelia to the border of Mongolia, a Pan-Turanian movement in this limited sense presents a much more feasible programme than the wider movement. These peoples, moreover, are all adherents of Islam, and between them a close cultural and linguistic affinity exists. At the close of the War the Turco-Tatars numbered roughly 26,000,000, of which about 10,000,000 lived in the territory of the existing Turkish state. While union of all peoples of the five Turanian branches is only a fantastic theory, the movement for political, cultural, and religious cohesion between the Turco-Tatars was a practical policy, pregnant with great possibilities. This is chiefly the result of the unsettled conditions which exist in the Near East and Central Asia in consequence of the peace treaties and the Russian Revolution. Turkey, shorn almost completely of her alien subject races, emerged from the War as a compact Turco-Tata state Smaller in territory but stronger in vitality than the Ottoman Empire, nationalist Turkey abandoned the Caliphate and the old Turkish Pan-Islamic policy, evolved a race-consciousness based on the hardy Osmanli Turk peasant population of the Anatolian plateau, and adopted a Pan-Turanian policy. Instead of aiming at the subjection of the alien races to the Northwest and South, Turkey be-

gan to look eastward, to her Tatar and Turcoman kinsmen. Direct effects of the Russian Revolution, such as the establishment of the independent republic of Azerbaijan and the opening of Russian Central Asia to Turkish influence, brought this policy clearly within the realm of "Realpolitik." In the very obscure and hazy picture which Central Asia presented in the first five years after the War, strong Turkish influences could be discerned at work and there were many indications that a definite policy was being pursued with the view of creating a Turanian federation, to consist of Turkey, Azerbaijan, Turkestan, and Afghanistan. The actual conclusion of treaties by Turkey with Azerbaijan and Afghanistan in 1922 could be considered as a definite step in this direction. At the same time Enver Pasha, who had been branded a traitor by the Kemalists at Angora and who previously had been active in the Caucasus, pursued in Turkestan a Pan-Turanian policy of his own. In 1921 and 1922 he placed himself at the head of Turcoman bands and attempted to establish in this region a Turanian state in opposition to the Central Asiatic policy of Soviet Russia. His defeat by Soviet troops and his reported death in 1922 were a temporary setback to the Pan-Turanian movement. Notwithstanding apparent coöperation between Angora and Moscow in Central Asia, for purposes of present-day policy, Pan-Turanianism and communism are fundamentally at variance, and clashes between the two policies based on these doctrines are bound to appear in the future. There is more room for harmony between Pan-Turanianism and Pan-Islamism in Central Asia. On the whole the limited Pan-Turanian movement aiming at a union of the Turco-Tatar peoples contained a strong element of realism and had marked political, economic, and cultural possibilities, particularly in view of the unsettled conditions in the Near East and Central Asia. See TURKESTAN, RUSSIAN.

PAPER. See CHEMISTRY, ORGANIC.

PAPER AND WOOD PULP. The growth in the paper and wood pulp industries during the first 25 years of the twentieth century was extraordinary, and the increased production of printed matter of various kinds was remarkable in most of the civilized countries. The United States ranks first among the paper-producing countries of the world and is followed by Great Britain, Canada, and Germany, in the order mentioned, although other countries contribute wood pulp, which is the basis of the industry. The 1920 world production of paper was estimated at some 14,000 000 tons, of which the United States contributed more than half. In fact the paper and printing industries combined ranked sixth in the general census of United States manufactures taken in 1921. Among the four major groups when considered from the standpoint of product, they were worth $3,162,732,000, distributed as indicated in the accompanying table, which gives statistics for the census years 1919 and 1921 and, where comparable, for 1914

PAPER AND PRINTING INDUSTRIES

	Census year	Establishments	Wage earners	Wages	Cost of materials	Value added by manufacture	Value of product
					Thousands of dollars		
Total	1921	25,344	468,286	639,124	1,336,232	1,826,500	3,162,732
	1919	36 403	509,875	564,510	1,306,718	1,705,866	3,012,584
	1914	37,196	452,900				1,456,046
Paper and wood pulp	1921	726	105,294	127,029	445,992	221,414	667,436
	1919	729	113,759	135,691	467,483	320,577	788,059
	1914	718	88,451	53,246	213,181	118,966	332,147
Manufactures of paper, including wall paper not made in paper mills	1921	1,880	80,279	76,520	224 416	190,479	414,895
	1919	1,967	94,759	77,408	253,742	210,172	463,914
	1914						
Printing, publishing, and allied industries	1921	22,738	282,713	435,575	665,824	1,414,577	2,080,401
	1919	33,707	301,357	351,411	585,493	1,175,118	1,760,610
	1914	33,171	272,092	195,510	257,847	643,687	901,535

Source Bureau of the Census, 1921 preliminary figures

At the base of paper manufacturing was the production of pulp, which in 1922 amounted to 3,464,258 tons, or slightly less than the record production of 1920, 3,807,656,000 tons. There are four major grades of pulp, and the proportionate production in the United States from 1914 to 1922 is indicated in the accompanying table.

PRODUCTION OF PULP IN THE UNITED STATES
(Tons of 20 00 pounds)

Grades	1911	1919	1920	1921	1922
Total	2,893,150	3,384,768	3,807,656	2,801,438	3,464,258
Ground wood	1,305,130	1,449,799	1,578,300	1,268,012	1,481,935
Sulphite	1,187,151	1,385,706	1,576,676	1,105,905	1,331,691
Sulphate	52,641	161,887	212,888	148,165	256,107
Soda	347,928	377,473	431,971	272,287	383,055
Other than wood pulp	...	9,903	7,821	7,069	11,470

Sources: Figures for 1914 from the report of the Bureau of the Census, Paper and Wood Pulp; 1919–22 figures from Federal Trade Commission Summary for 1922.

The United States does not produce all the wood pulp used in its paper industry, and considerable amounts of sulphite chemical wood pulp, both bleached and unbleached, and sulphate pulp, principally unbleached, are imported from Canada, Sweden, Norway, and Finland. The amount of sulphite imported in 1923 was

712,393 tons, valued at $48,791,077. This material entered the United States free of duty, and so did the sulphate wood pulp, of which, in unbleached form, 233,503 tons, imported in 1923, were valued at $15,204,012. The principal quantity came from Canada, which supplied 131,168 tons, as compared with 76,552 tons for Sweden. Of the sulphite in 1923, Canada furnished 299,183 tons, followed by Sweden with 201,023 tons, Finland with 70,665 tons, and Norway with 68,071 tons.

In 1921 the United States Census of Manufactures showed that out of 726 mills in the entire country, New York had 155 and was followed by Massachusetts and Wisconsin with 69 and 62 mills respectively. These three States indicated the geographical distribution of the industry, as the Middle Atlantic States were first in the number of mills, while New England and the Lake States were second and third respectively. At the beginning of 1923 there were 1691 paper-making machines with an estimated capacity of 9,560,000 tons per annum, and the normal running time of each machine was stated to be 270 days, about 75 per cent of the actual capacity. It will appear from the following table that the production of paper increased in the United States up to 1920, when the peak was attained with a total output of 7,334,614 short tons. There was a considerable falling off in 1921 due to the carrying over into that year of surplus stock from 1920, and in the years 1922 and 1923 the quantities produced were less, although in 1923 there was an increase in value. The table indicates the distribution of the production for 1914 and the years 1919-22 and also shows the development and production in the various lines.

NEWSPRINT PRODUCTION IN THE UNITED STATES AND CANADA
(Thousands of tons)

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
United States	1,305	1,283	1,239	1,315	1,359	1,260	1,375	1,512	1,225	1,148
Canada	350	415	489	608	686	735	803	876	808	1,082
Total	1,655	1,698	1,728	1,923	2,045	1,995	2,178	2,388	2,033	2,530

ANNUAL PRODUCTION OF PAPER IN THE UNITED STATES
(Tons of 2000 pounds)

Grades	1914	1919	1920	1921	1922
Total	5,270,047	6,190,361	7,334,614	5,356,317	7,017,800
News	1,313,284	1,374,517	1,511,968	1,226,189	1,447,688
Book	921,183	914,823	1,104,464	725,992	981,919
Board	1,291,805	1,950,037	2,313,449	1,664,931	2,156,113
Wrapping	911,029	869,631	1,043,812	782,468	1,048,393
Writing	247,728	343,762	389,322	242,485	361,050
Tissue	115,401	155,400	177,447	148,142	197,524
Hanging	96,527	92,136	113,824	69,725	91,894
Felts and building	243,908	281,962	366,941	286,111	421,786
All other	129,182	208,093	313,387	210,274	311,433

Sources: Figures for 1914 from the Bureau of the Census; figures for 1919–22, Federal Trade Commission Summary for 1922.

The United States also imported considerable paper, principally newsprint, which entered from Canada free of duty and in 1923 amounted to 2,617,685,620 pounds, valued at $98,021,045. Out of total imports of paper of $116,137,795, the foreign paper entering the United States did not compete seriously with the domestic product as American mills could not supply the great demand for newsprint. In regard to exports, however, American manufacturers do not compete actively on the basis of price but rather on that of quality. The total exports of paper except printed matter in the year 1923 aggregated $25,677,685 in value, of which newsprint accounted for $1,636,937; book paper, $3,001,149. Wrapping-paper, paper-board and straw-board, writing-paper, and photographic paper were among the other leading exports. The production of newsprint in the United States and Canada is indicated in the accompanying table, which shows the steady character of the industry in the United States as well as the marked increase in Canada. In the period under review there was an increase in prices which reached a maximum of about $.0608 in January, 1921, from which it declined to $.0375 in January, 1923. The increased demand for newsprint was due largely to the great extension of advertising, especially in the daily and Sunday papers, and it was estimated that $700,000,000 was expended for newspaper advertising alone in 1922.

The Canadian paper industry from 1914 to 1924 developed extraordinarily, not only for newsprint but also for book paper and writing-paper. The newsprint production, which in 1913 had been less than 400,000 tons, had increased to 875,696 by 1920, and after a temporary decline in 1921, reached a maximum of 1,166,225 tons in 1923, of which 1,043,139 tons were exported. The United States took 102,558 tons. For Conservation movement, see FORESTRY.

PAPINI, GIOVANNI (1881–). An Italian writer (see VOL. XVIII). He was the editor of *Lacerba* from 1913 to 1915 and *La Vrate Italie* in 1919. Converted to Catholicism in 1920, he published in the following year a *Life of Christ* which was translated into several languages and had a tremendous sale all over the world. In 1922 *Four and Twenty Minds* (*Ventiquattro Cervelli*) was published. It was a collection of essays written between 1902 and 1912. In his *Life of Christ* Papini made no attempt to apply any of the learned techniques of modern criticism. He contented himself like a true believer in rewriting the story of the Gospels in an artistic and imaginative fashion. In America the book was highly praised by many clergymen but was at the same time severely criticized by professional scholars. In 1924 Papini was invited to lecture at Columbia Uni-

versity on Italian life and literature, but did not accept. His autobiography, *The Failure*, was translated and published in New York in 1924. See ITALIAN LITERATURE.

PAPUA. See NEW GUINEA.

PAPYRI. See PHILOLOGY, CLASSICAL.

PAQUET, ALFONS (1881–). A German writer and traveler, born at Wiesbaden, and educated there and at the School of Commerce in London as well as the Universities of Heidelberg, Jena, and Munich. He traveled over the greater part of the world. Of his many works may be mentioned: *Auf Erden* (1906); *Held Namenlos* (1911); *Kamerad Fleming* (1911); *Li Oder im Neuen Osten* (1912); *Limo, der Grosse Bestandige Diener* (1913); *Erzahlungen an Bord* (1914); *In Palastina* (1915); *Nach Osten* (1915); *Im Kommunistischen Russland* (1919); *Der Geist der Russischen Revolution* (1919); and *Der Rhein als Schicksal* (1920).

PARAGUAY. A republic of South America with an estimated area of 196,000 square miles. The population was estimated at 800,000. The capital, Asuncion, had an estimated population of 99,836 in 1920. Other large towns are: Villarrica, 34,500; Concepcion, 25,000; Encarnacion, 16,000. Immigration increased little, in 1920 only 330 immigrants receiving state aid, and in 1921, only 576. In August, 1921, in the 27 National Colonies there was a population of 13,808 of whom 7755 were males. Education was still backward and in 1919 the total school registration was only 80,000 pupils.

Industry and Trade. Agriculture and grazing were the leading activities though more than half the total acreage was unexploited. The following products figured in Paraguay's foreign trade in 1922: extract of *quebracho* (used in tanning), 37,799,984 kilos; *quebracho* logs, 1,613,690 kilos; maté (Paraguayan tea), 5,186,587 kilos; oranges, 116,008,267 kilos; tobacco, 4,177,673 kilos. The cattle industry continued to increase up to 1920, there being 5,249,043 cattle in 1916. Other animals included: 600,000 sheep, 478,000 horses, 25,000 asses and mules, 61,000 pigs, and 87,000 goats. In 1922, 299,522 hides were exported and 1,553,572 kilos of jerked beef. Sugar and cotton were receiving greater attention. The sugar production in 1920 was 5230 tons; in 1921, 2579 tons; in 1922, 2400 tons. In 1922, 844,219 kilos of ginned and unginned cotton were exported. The 1922 production of cotton was 7000 metric tons. The country enjoyed great prosperity during the War because of the world demand for meats, but the depression of 1921–22 hit Paraguay particularly because of the low quality of its beef. The result was the absolute disappearance of any market for Paraguayan cattle. The fluctuations are reflected in the following figures (gold peso = $0.96): imports for 1914, 5,149,000 gold pesos; for 1919, 15,835,970; for 1921, 8,358,922; for 1923, 5,514,245; exports for 1914, 4,584,000 gold pesos; for 1919, 14,816,117; for 1921, 9,316,721; 1922, 9,599,007. The following were the proportions in value by countries of origin of Paraguay's imports: for 1913, Great Britain, 29 per cent; Germany, 28 per cent; Argentina, 13 per cent; United States, 6 per cent. For 1920, 1921, and first half of 1922: Great Britain, 19, 21, and 25 per cent; Germany, 3, 7, and 7 per cent; Argentina, 38, 39, and 36 per cent; United States, 24, 17, and 15 per cent. Many of the imports from Argentina were merely reshipped. The greater bulk of the exports went to Argentina for reshipment abroad.

Finance. The 1913 estimated revenue was 3,248,000 gold pesos and 21,688,000 paper pesos (paper peso worth 7 cents); estimated expenditure was 1,863,000 gold pesos and 48,307,000 paper pesos. The 1922–23 estimated expenditure was 1,011,058 gold pesos and 90,338,252 paper pesos (paper peso worth 3 cents); estimated revenue was 778,116 gold pesos and 99,805,100 paper pesos. On Dec. 31, 1922, the outstanding external debt was $5,842,692 and the internal debt (including outstanding paper money), $7,439,180. In 1914, the figures were external debt, $3,757,573; internal debt, $5,091,218.

History. Sr. Eduardo Schaerer (1911–15) was the first president in 40 years to complete his term He was succeeded by Sr. Manuel Franco (1916–19) under whose peaceful administration the country made advances in the development of the packing industry, the products of which, by 1919, became Paraguay's leading export. Sr Manuel Gondra was elected for 1920–24, but he resigned in 1921, and was succeeded by Dr. Eusebio Ayala. These changes were due to threatened revolts. In 1921, it was announced that Paraguay would not meet her external obligations, with the result that an American financial adviser was called in to render assistance. In 1923, Dr. Eligio Ayala was elected provisional president.

PARALYSIS, INFANTILE. See INFANTILE PARALYSIS

PARASITOLOGY. See VETERINARY MEDICINE.

PARAVANE. A naval device developed by Commander C D Burney of the British Navy. Its earlier form, the explosive paravane, was designed mainly for use against submerged submarines and had many resemblances to the old Harvey towing torpedo. It consisted of two cigar-shaped submerged mines, each carrying an explosive charge and a depth mechanism to insure its sustained immersion at the desired depth. The mines were towed by cables, one on each side of the ship, and were deflected outward by fixed vanes on the shell until the towing cables made an angle of 20° to 60° with the ship's course, depending on the speed. The explosion of the charge took place if the hull of a submarine or the shell of a mine were struck or if a firing key on the bridge were pressed. In the later type, the torpedo-shaped floats, or "otters" as they were called, carried no explosive charge but were fitted with saw-like jaws for cutting mine-anchor cables. The towing rope was attached to the stem of the ship a dozen feet or more below water. Any mine which did not squarely strike the stem of the ship was caught by one of the towing ropes pressing against the anchor line. The latter slid along the towing rope until it reached the "otter's" jaws, where it was instantly cut. The mine then rose to the surface clear of the ship and could be easily destroyed by gunfire. This type of paravane was eventually fitted to all large warships and merchant steamers. Paravanes saved many vessels from being sunk by mines and revealed the location of several new and unknown mine fields. They were also used for mine-sweeping and in searching for mine fields. See MINE, SUBMARINE.

PARIS. See WAR IN EUROPE, *Western Front*.

PARIS CONFERENCE. See PEACE CONFERENCE AND TREATIES.

PARK, JULIAN (1887–). An American educator, born at Buffalo, N. Y., and educated at Williams College and the Paris, Columbia, and Minnesota Universities. He was assistant director of the Buffalo Fine Arts Academy from 1911 to 1913 and in the latter year was appointed instructor in French at the University of Buffalo He was successively instructor in history, professor of history, and department head, secretary of the College of Arts and Science, and dean. The last office he held after 1918. He was a member of many historical and learned societies and was the author of *Philatelic Rambles* (1912); *History of the University of Buffalo* (1917); *Subject Peoples under the Teutons* (1918); and *Cuba in the Seven Years' War* (1920). He was a frequent contributor to *The University of Buffalo Studies.*

PARK, WILLIAM HALLOCK (1863–). An American bacteriologist, pathologist, and sanitarian, born in New York City, and educated in the College of the City of New York and Columbia University. In 1897 he was made professor of bacteriology and hygiene in the Bellevue-University Medical College, and after the death of Egbert Lefevre, dean of the faculty there. In 1894 he had been appointed director of the bureau of laboratories of the New York Board of Health. In 1900 appeared his textbook, *Bacteriology in Medicine and Surgery,* while in 1910, in collaboration with Williams, he published *Pathogenic Microörganisms,* which passed through 7 editions in 10 years. He edited the reference work *Public Health and Hygiene* (1920) and was a voluminous contributor, alone or in collaboration, to the periodical press, with special reference to diphtheria and typhoid fever

PARK COLLEGE. A nonsectarian institution at Parkville. Mo., founded in 1875. The size of the college remained approximately the same during the decade between 1914 and 1923–24, with an enrollment of 412 students, a faculty of 24, and a library of 25,000 volumes in the former year, compared with an enrollment of 443 students, of whom 94 were in the preparatory school, a faculty of 28, and a library of 30,000 volumes in the latter. Several buildings were put up, including the president's residence, a men's dormitory, a lighting and heating plant, and a Carnegie Library, as well as a science building which was in course of construction in 1924. The endowment fund was about doubled President, Frederick William Hawley, D.D., LL.D.

PARKER, SIR GILBERT (1862–). An English novelist (see VOL. XVIII). From 1900 to 1918 he was a member of Parliament from Gravesend. He was created a baronet in 1915. During the first two years of the War he had general charge of British publicity in the United States and in this capacity did excellent service in creating favorable sentiment in behalf of the Allies. His later books include: *You Never Know Your Luck* (1915); *The World For Sale* (1916); *Wild Youth* (1919); *No Defense* (1920). He also wrote, in 1915, *The World in the Crucible,* a book on the War.

PARKS, NATIONAL. Congress created in August, 1916, the National Park Service, which placed the national parks and monuments in the Department of the Interior, under the general charge of a director. The act provided also that the Secretary might make rules and regulations for the use and management of the reservations and prescribe punishment for the infraction of such rules and regulations. Up to 1916, 16 parks had been created; the latest up to that time were the Hawaiian National Park in the Territory of Hawaii and the Lassen Volcanic National Park in Northern California. A bill was introduced into Congress in 1916 for the establishment of Mt. McKinley National Park in the Territory of Alaska. A tract of land in 1916 was given by citizens of Maine to the Government of the United States. It has an area of 10,000 acres, on Mt. Desert Island. It was given by President Wilson, the name of Sieur de Montes National Monument, but in 1919 Congress renamed it Lafayette National Park. The number of visitors to the national parks steadily increased during the decade. In 1918 there were 451,691 visitors; in 1920, 1,058,455. In view of the increasing interest and importance of the national park system, the attempts of private irrigation and water power system interests to obtain control gave serious concern to the authorities during the decade Among the various projects considered likely to injure the parks was that for a dam at the outlet of Yellowstone Park. The formal dedication of the Grand Canyon of Colorado as a national park took place on Apr. 20, 1920. In the year 1921 visitors to the national parks numbered considerably over 900,000, while the visitors to the national monuments numbered 164,461 The first national conference on State parks was held in 1920 at Des Moines, Iowa The purpose of the movement is to preserve places in the various States and to maintain them under State control as centres of health, recreation, and education. As a result of the conference, several States which heretofore had no State parks undertook the first steps to secure them. The Hawaiian National Park was formally dedicated on July 9, 1921. This is on the rim of the crater of Halemaumau. The park contains two active volcanoes, Kilauea and Mukuaweoweo. Bills were introduced in Congress during this year for national parks in Utah: the Mammoth Cave in Kentucky; Mt. Katahdin, Me.; Mt. Baker, Wash.; Mt Battell, Vt.; Kill Deer Mountain, N. D.; and Roosevelt National Park, N. D There were also several proposals for national monuments in Colorado, Washington, Nevada, and other States. The visitors to the parks in 1922 numbered 1,216,490. This year marked the fiftieth anniversary of the establishment of Yellowstone Park, the first of its kind in the world. During this year, legislation was passed adding to the area of Mt. McKinley Park in Alaska and to that of Hawaii National Park. Bills were also introduced for the establishment of other parks in Washington, Arkansas, South Dakota, Virginia, and Georgia. A movement was undertaken to increase the area of the Sequoia National Park in California and to change its name to the Roosevelt-Sequoia. No action was taken by Congress. The number of visitors in 1923 (1,280,886) again exceeded that of the previous year; while visitors to the national monuments numbered 212,826. The movement to save the great redwoods of California which was carried on throughout the decade received fresh impetus during 1923 by the action of the California Legislature, which passed, in May, a law calling for a survey of all timber lands available for park purposes by the State Forestry Board. Congress in 1923 empowered the Secretary of the Interior to obtain complete

title to any or all of the private holdings within Glacier National Park, by exchanging them for other public lands of equal value in Montana. Bills were introduced for the Appalachian National Park in Virginia and the Lincoln National Park in Kentucky, Tennessee, and Virginia. By presidential proclamation, new national monuments were established at Fossil Cycad in South Dakota; Aztec Ruin in New Mexico; Hovenweep in Utah and Colorado; and Pipe Spring in Arizona. In addition, the Bryce Canyon National Monument and the Timpanogos Cave in Utah were established under the Department of Agriculture, and the Mt. City Group National Monument in Ohio under the War Department.

PARMOOR, CHARLES ALFRED CRIPPS, first BARON (1852–). An English lawyer, educated at Oxford. He was one of the most prominent laymen of the Church of England. Elected to Parliament in 1895, he was a Conservative in politics but later broke away from his party because of his free trade ideas. He supported Labor, became a strong believer in the League of Nations, and was appointed by Prime Minister Ramsay Macdonald as Lord President of the Council in his cabinet, where he was responsible for matters arising out of Great Britain's membership in the League of Nations. He published *Principles of Compensation* and *Laws of Church and Clergy.*

PARODI, DOMINIQUE (1870–). A French philosophical writer, disciple of Renouvier and Hamelin. He published in 1919 a comprehensive survey of contemporary French philosophy (*La Philosophie Contemporaine en France, Essai de Classification des Doctrines*). His other works include *Le Problème Moral et la Pensée Contemporaine* (1910) and *Traditionalisme et Démocratie* (1909).

PARSONS, FRANK ALVAH (1868–). An artist and critic born at Chesterfield, Mass., who studied art in Italy, France, England, and Austria. He has published many books on art, including *Principles of Advertising Arrangement; Interior Decoration, Its Principles and Practice; The Psychology of Dress; The Art Appeal in Advertising Display.* He was co-author of *Advertising, Its Principles and Practice,* and *Art, Its Principles and Practice Applied to Modern Life.* Besides writing books on art he has delivered lectures in many parts of the United States and written articles and pamphlets on art subjects. He was president and director of the New York School of Fine and Applied Art, after 1905, and one of the most influential art educators in the United States.

PASHITCH, NIKOLA (1845–1926). A Jugo-Slav statesman. For over 50 years he was one of the leading political figures in the Balkan states and was Prime Minister of Serbia more than 12 times. He was twice imprisoned for refusing to lend himself to the former Obrenovitch dynasty in behalf of Austria-Hungary. He was one of the most prominent figures at the Peace Conference in Paris, where largely through his efforts the kingdom of Jugo-Slavia was established. In 1923 an unsuccessful attempt was made on his life. His negotiations with Italy settled in 1923 the long-disputed Fiume question See JUGO-SLAVIA.

PASSY, PAUL EDOUARD (1859–). A French philologist who has made a special study of phonetics (see VOL. XVIII). His later publications include: *Phonetic Reader* (1915); *Premier livre de Lecture* (1917); *Lectures Françaises Phonétiques* (1918), and *Conversations Françaises en Transcription Phonétique* (1919).

PASTOR, LUDWIG (1854–). A German historian (see VOL. XVIII). He lives in Innsbruck and in Rome. His publications during the decade 1914–24 were: *Conrad von Hötzendorf* (1916); *Generaloberst von Danke* (1916); and *Der Staat Rom zu Ende der Renaissance* (1916). He edited *Johannes Janssens Briefe* (1922).

PATERSON. A manufacturing city of New Jersey. The population increased from 125,600 in 1910 to 135,875 in 1920, and to 139,579, by estimate of the Bureau of the Census, for 1923. A comprehensive zoning ordinance was adopted in 1921, providing for four residence and two business districts and a light and a heavy industrial district. Four modern school buildings were completed, 1914–1924, and in the latter year a $1,250,000 high school was in process of construction The number of manufacturing plants increased from 702 in 1909 to 1200 in 1923, and the value of their output from $67,000,000 to $225,000,000. Paterson is the leading silk manufacturing centre in the United States, About 30,000 persons were engaged in the silk manufacturing industry alone in 1924. Bank resources rose from $43,000,000 in 1914 to $110,952,976 in 1924

PATTERSON, JOHN THOMAS (1878–). An American zoölogist, born at Piqua, Ohio, and educated at Wooster University and the University of Chicago. He was professor of biology at Buena Vista College (1903–05); assistant in zoölogy at the University of Chicago (1905–08); and instructor (1908–11), adjunct professor (1911–13), and professor (1913–) at the University of Texas. He published articles in zoölogical journals on the embryology of the armadillo and on polyembryony in insects.

PAUL TEST. See SMALLPOX.

PAVEMENTS. See ROADS AND PAVEMENTS.

PAYNE, GEORGE HENRY (1876–). An American writer, born in New York City, and educated at the College of the City of New York, the College of Pharmacy, and the New York Law School. He was for many years engaged in newspaper work in New York City and took an active part in politics as manager of campaigns for several candidates. In 1917 he was appointed New York City's representative on the State Council of Defense and organized the Committee of American Business Men in 1919. His books include *History of the Child in Human Progress* (1915) and *History of Journalism in America* (1919). In 1920 he purchased *The Forum.*

PAYNE, JOHN BARTON (1855–). An American public official, born at Pruntytown, Va., and educated at Orleans, Va. He began to practice law in West Virginia in 1877. He was active in politics and in 1882 was elected mayor of Kingwood, W. Va. He moved to Chicago in 1883. He was appointed judge of the Superior Court of Cook County, Ill., holding the office for five years. He was appointed general counsel of the United States Shipping Board Emergency Fleet Corporation in 1917 and to the director general of railroads in 1918. He held the post of Secretary of the Interior in President Wilson's cabinet from February, 1920, to Mar. 4, 1921. He was made chairman of the American Red Cross by President Harding on Oct. 1,

1921. In April, 1923, he was one of two commissioners appointed by President Harding to confer with representatives of Mexico with a view to American recognition of Mexico. The negotiations were opened in May, and after weeks of discussion in regard to damage claims, boundary disputes, and the holding of oil and agricultural lands by foreigners, matters were arranged, and recognition consummated by Aug. 31, 1923.

PEABODY MUSEUM OF HARVARD UNIVERSITY. The museum continued active work during the decade 1914–24. Expeditions were sent out in 1915 to the Canary Islands, the Libyan Desert, and Arizona. Researches were continued also in Central America and the Delaware Valley and other parts of the United States. During 1916 the museum was engaged in preparing for publication the first number of the *Harvard African Studies*, six volumes of which were published up to 1924. Much valuable material was received from the Koren Arctic Expedition to northern Siberia. In 1917 the Central American Expedition continued its work and made discoveries of large groups of ruins in Honduras and Guatemala. Field work was carried on in the cliff-house region of northeastern Arizona. The seventh volume of the museum papers dealing with the history of the Spanish conquest of Yucatan was issued. Two of the five large exhibition halls in the new section of the museum were opened to the public. After the entry of the United States into the War, the active work of the museum was largely suspended, but in 1918 an expedition was sent to the Vancouver Islands to study Indian remains there. Explorations were also carried on in various parts of the United States. The normal activities were gradually reëstablished during 1919, but little field work was carried on. Several valuable collections were received, including the Bates Collection from the shell heaps of Maine. The museum issued several important publications during this year The field work in 1920 was confined chiefly to Arizona and Africa. Much important material relating to the cliff dwellers was collected In 1921 extensive field work was conducted in various fields An expedition to Central America visited ruins in northern Yucatan and continued investigations into northern Guatemala Explorations into Arizona were continued, and researches were carried on in France and Belgium. Considerable additions were made to the collections of the museum by purchases and gifts in 1922, and important rearrangements and exhibits were made. Field work in Central America was prosecuted during the year, and the expedition to Arizona continued its investigations. In 1923 the Central American expedition spent three months in Yucatan, Honduras, and Guatemala. One of the results of this work was the discovery of an ancient culture previously unknown to scientists. Valuable collections were received from the New Hebrides group, and the museum received the Theodore N. Vail collection of stone implements.

PEACE CONFERENCE AND TREATIES. A task of world-wide reconstruction and readjustment confronted the statesmen and diplomatists of the victorious Allied and Associated Powers at the end of the Great War. To arrange a settlement of the problems of peace a whole series of conferences has been held from 1919 to 1924 and the results of their deliberations have been registered in numerous agreements, treaties, protocols, and conventions, or have silently woven themselves into the very warp and woof of human society. During the War the Allied cause in general had represented "a most curious combination of lofty idealism with an undercurrent of selfish ambition." The openly avowed ideals were usually at utter variance with the more sordid ulterior aims. "Practical" men—nationalists, imperialists and militarists—insisted that the immediate problem was to punish Germany and her allies for their atrocious crimes against civilization, to exact the greatest possible indemnity, to reduce the Central Empires to military impotence and so to cripple German industry and commerce as to make impossible any effective or dangerous competition by her in the future economic development of the world. The German colonies and the Turkish Empire were to be divided up among the victors and the litigious estates of the Habsburgs liquidated to satisfy the nationalistic aspirations of Italy and the smaller Allies. Most of these aims had been embodied in the secret engagements and commitments negotiated by the various European Allies and Japan at intervals during the years 1915, 1916, and 1917, before the United States entered the War. In regard to Turkey secret discussions continued unabated throughout the conflict and at the time of the Peace Conference in 1919 Lloyd George and Clemenceau were still haggling silently but strenuously over the division of the spoils These secret treaties constituted a comprehensive programme for dividing up the world, a hard and fast basis for the final peace settlement. They "were destined to bear a crop of suspicion, controversy, balked ambition, which twice at least, nearly wrecked the Peace Conference, poisoned its discussions, and warped and disfigured its final decisions."

Entirely opposed to the plans of settlement represented in the secret treaties were the openly voiced aspirations of numerous liberal and labor groups in the various belligerent countries. Some of the statesmen who professed idealistic motives were sincere in their convictions; others utilized idealism as a cloak for their activities while engaged in forging the chain of secret treaties. Yet their utterances outwardly imparted to the Allied cause during the last few years of the War all the moral elevation of a crusade for human righteousness. In particular the various addresses of Woodrow Wilson, President of the United States, served to clarify the fundamental issues of the War and to provide a set of legitimate aims and guiding principles for the inauguration of a more enlightened era of international peace and coöperation. From 1917 on Mr. Wilson enjoyed an unparalleled prestige and influence in the public opinion and counsel of the world. The principles of his war-aims addresses of 1918 were the official basis of the pre-armistice terms agreed upon with Germany and her associates. These terms were binding on all parties and constituted in a technical sense the legal basis of the peace settlement. With two qualifications the Allied Powers bound themselves to impose no conditions of peace inconsistent with Mr. Wilson's "Fourteen Points" of January 8, his "Four Principles" of February 11, his "Four Ends" of July 4, and his "Five Particulars" of September 27. Judgment was reserved by the Supreme War Council on the second of the Fourteen Points relating to the



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CENTRAL EUROPE BEFORE THE WORLD WAR


CENTRAL EUROPE
Scale of Miles
0 50 100 200
Cities with over 1 000,000 ..... Berlin
Cities with 200,000 to 1 000,000 ..... Naples
Cities with 100,000 to 200,000 ..... Venice
Smaller Places ..... Erfurt
Capitals with less than 100,000 ..... BERNE
Capitals of Countries ⊙ Other Cities ○
NORTH SEA
BALTIC SEA
SWEDEN
DENMARK
EAST PRUSSIA
POLAND
RUSSIA
UKRAINE
GERMANY
BOHEMIA
CZECHOSLOVAKIA
GALICIA
BAVARIA
AUSTRIA
HUNGARY
SWITZERLAND
ADRIATIC SEA
TYRRHENIAN SEA
IONIAN SEA
ÆGEAN SEA
BLACK SEA
MEDITERRANEAN SEA
Skager Rack
Kattegat
Gothenburg
Linköping
Jonköping
Karlskrona
Oslo
Lund
Malmö
Copenhagen
Memel
Kovno
Vilna
Minsk
Grodno
Pinsk
Brest-Litovsk
Königsberg
Danzig
Hamburg
Bremen
Lübeck
Stettin
Berlin
Potsdam
Posen
Warsaw
Hanover
Magdeburg
Brunswick
Dortmund
Düsseldorf
Cologne
Aachen
Frankfort on Main
Kassel
Leipzig
Dresden
Chemnitz
Erfurt
Gorlitz
Breslau
Lodz
Lutsk
Krakow
Lemberg
Carlsbad
Prague
Pilsen
Nuremberg
Würzburg
Mannheim
Karlsruhe
Baden Baden
Strassburg
Stuttgart
Munich
Augsburg
Linz
Danube
Vienna
Salzburg
Innsbruck
Zurich
Berne
Basel
Milhouse
Debrecen
Budapest
Odenburg
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Balaton L.
Szegedin
Maria Theresiopel
Laibach
Agram
Temesvar
Fiume
Sava R.
Trieste
Milan
Padua
Verona
Venice
Ferrara
Ravenna
Bologna
San Marino
Pisa
Florence
Leghorn
Ancona
Pola
Zara
Banjalukao
Sarajevo
BELGRADE
Nish
Crajova
Bucharest
Danube
Ortnje
Castro
Prisrend
Uskup
Scutari
Foggia
Bari
Brundisi
Otranto
Naples
Mt. Vesuvius
Gulf of Taranto
Corfu
Janina
Tchalis
Monastir
Salonika
Seres
Philippopolis
BULGARIA
Rustchuk
Galatz
Braila
Jassy
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Temesvar
Szegedin
Debrecen
Odenburg
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"freedom of the seas"; this was declared to be open to various interpretations some of which they were unable to accept. In addition it was expressly stipulated that the demands for the restoration of territories invaded by Germany should include compensation for all damages done to the civilian populations of the Allied countries by land, by sea and from the air The Armistice signed with Austria and Hungary was unconditional as finally agreed upon, yet the preceding diplomatic exchanges between the Austro-Hungarian and American governments had created, if not a legal, at least a strong moral obligation to arrange peace upon the basis of the President's addresses except in regard to Point Ten, which was modified by Wilson himself to assure complete and unconditional self-determination to the Czecho-Slovaks and Jugo-Slavs hitherto incorporated in the Dual Monarchy. With Bulgaria and with Turkey Mr. Wilson entered into no negotiations at all, but the Fourteen Points touched upon their cases

The two months which elapsed between the signing of the Armistice with Germany (Nov. 11, 1918) and the first meeting of the major Allied plenipotentiaries in Paris (Jan 12, 1919) were marked by extremely significant developments throughout the world The contemporaneous revolutions in Central Europe which resulted in the establishment of democratic republics in Germany, Austria, and Hungary failed to effect any considerable change in the attitude or plans of the Allies. In Italy a tremendous wave of nationalistic feeling overwhelmed all efforts of liberal and socialist leaders to pledge the support of that country to a peace of conciliation. A ministerial crisis was precipitated in late December and early January, but with the resignation of socialists and moderates, the imperialist group headed by Premier Orlando and Foreign Minister Sonnino strengthened its grip upon the government In France Premier Clemenceau, unmoved by socialist attacks, announced his intention of securing the utmost possible security and indemnification for France together with the maintenance of the old system of alliances His government received an overwhelming vote of confidence as he thus threw down the gage. In Great Britain, Parliament was dissolved in November and a general election held on December 14. Premier Lloyd George, discarding the liberalism of his war-aims speech of Jan 5, 1918, made the issue of his campaign a hard and bitter peace. His platform included recovery of the entire costs of the War—"shilling for shilling and ton for ton" —and punishment of war criminals. The result was a stupendous triumph for his Coalition which secured a majority of over 260 seats. The Labor party advocating a Wilsonian peace secured 61 seats and became the Official Opposition

President Wilson could point to no such popular mandate or parliamentary vote of confidence Indeed, despite his appeal to the American people for support in the shape of a Democratic Congress, the elections of November 5 had returned small Republican majorities in both the House and the Senate. Republican leaders in office and out were bitterly attacking the President's policies Ex-President Roosevelt was particularly vehement. He openly asserted that Mr Wilson had no authority whatsoever to speak for the American people as his leadership had just been emphatically repudiated by them. It was the duty of the Allies to impose their common will upon the nations responsible for the hideous disaster which had almost wrecked mankind. Mr. Roosevelt's manifesto harmonized perfectly with the purposes and plans of Clemenceau and Sonnino. Notwithstanding the fact that recent electoral reverses had thus seriously discredited his leadership at home, Mr. Wilson, against the advice of Secretary of State Lansing, made the momentous decision to go abroad as head of the American commission to negotiate peace. He was animated by a sincere determination to work for the incorporation of his ideals into the substance of the peace treaty, to see to it that no false or mistaken interpretation was put upon them and no possible effort omitted to realize them. He claimed to be under no illusions as to the difficulty of realizing his programme. Arriving in France on December 13, Wilson found that although the date for the Peace Conference had been set for the 17th a month more was to elapse before real work began. He spent the interval visiting the various Allied countries, conferring with statesmen and making speeches, being warmly received by liberal and radical elements which gave whole-hearted support to his reiterated proposals for a peace of justice.

THE PARIS PEACE CONFERENCE

The five Principal Allied and Associated Powers which had contributed most to the winning of the War assumed supreme charge of arranging the Peace. It was early decided to exclude the enemy powers from the impending Congress until preliminary terms had been agreed upon among the Allies. Paris—the shell-shocked nerve-centre of Allied resistance to Germany—was selected as the scene of the Preliminary Conference. Here on Jan. 12, 1919, there finally convened a meeting of the Supreme Council, its membership now comprising the chief executives of Great Britain, France, Italy, and the United States, together with their respective foreign ministers. Two Japanese representatives were admitted on the following day and this "Council of Ten," as it came to be known, definitely inaugurated the work of the Peace Conference and continued to dominate the course of events until the middle of March when it was transformed into the "Council of Four" and a subordinate "Council of Five."

Organization. Quickly the Council of Ten proceeded to the organization of Peace Conference machinery Thirty-two states which had been at war with Germany or had severed diplomatic relations with her were admitted to membership in the plenary Conference, though with varying degrees of representation. Adopting a middle course between the proposals of the extreme militarists who advocated a body made up of delegates from the Great Powers alone which should frame a treaty to be imposed on smaller Allied States and enemy powers alike, and the proposals of the extreme legalists who championed the theoretical equality of nations with uniform representation for all, the Supreme Council apportioned plenipotentiaries to each on the basis of size, military power and prestige and service or suffering in the recent War. Of the 70 officially authorized plenipotentiaries five were assigned to each of the Great Powers—France, Italy, Japan, Great Britain and the United States; three each to Belgium, Brazil, and

Serbia (later officially recognized as Jugo-Slavia); two each to Australia, Canada, China, Czecho-Slovakia, Greece, Hedjaz, India, Poland, Portugal, Rumania, and Siam; and one apiece to Bolivia, Cuba, Ecuador, Guatemala, Haiti, Honduras, Liberia, New Zealand, Nicaragua, Panama, Peru, and Uruguay. While thus allocating the formal representation for plenary sessions, the Council of Ten reserved to itself the power of determining the course of procedure, conducting preliminary deliberations and making the really important decisions. The plenary sessions were to prove almost entirely devoid of any significance save the ceremonial function of ratifying and registering decisions already made. On January 18, at the first plenary session, Premier Clemenceau of France, who presided at meetings of the Supreme Council, was elected as President of the Conference.

In addition to formally authorized participants in the Conference, streams of uninvited and sometimes unwelcome guests from all parts of the world converged upon Paris, in the hope of securing a hearing or at any rate of arousing interest in the aims and ambitions of their respective nationalities. Armenians, Syrians, Georgians, Ruthenians, Esthonians, Lithuanians, Letts, Finns, Albanians, Persians, Egyptians, Koreans, Zionists, Schleswigers, Aland Islanders, Irish-Americans, Negroes, and others came to present ex-parte evidence and plead for justice. "Never before had Europe witnessed such a gathering of rulers and rivals, of realists bent on material gains and idealists striving for a happier world." Realists and idealists alike usually met with disappointment. Small nations were to be allowed to present their cases; even neutrals were to be heard in matters specifically affecting their interests; but the real power was to rest with the chief representatives of the five largest states.

To assume, however, that the treaties emanating from Paris were drafted by a small group of men—the "Ten," the "Four," or the "Three"—and that the terms were fixed by them would be highly erroneous. Each delegation at the Conference had a numerous staff of territorial, ethnographic, and historical specialists, economic advisers and other experts, and these together with the plenipotentiaries supplied the personnel for some 58 technical commissions constituted during the first six months of 1919 to make preliminary investigations and reports on various problems of the settlement. These commissions held over 1600 meetings and their conclusions and recommendations were discussed by the Council of Ten, which held 72 meetings, the later Council of Four, which held 145 sessions, and the subordinate Council of Five, which met 39 times. Most of the articles in the treaty were taken bodily, without change, from the reports of commissions.

Wilson's First Point declaring for "open covenants openly arrived at" was seriously vitiated at Paris. Despite a keen struggle waged by the Americans for a wider measure of publicity, only the plenary sessions of the Conference were opened to the press. Lloyd George, Clemenceau, and Orlando uniting to demand that the executive councils deliberate in secret, it was decided and announced that publicity with regard to their proceedings "must be subject to the limitations necessarily imposed by the difficult and delicate nature of their object." The army of newspaper correspondents was obliged to be content with brief and non-committal communiqués issued each day, the scanty substance of which had to be supplemented with the gleanings of gossip, semi-official conferences with directors of publicity appointed by each delegation, and occasional interviews with important plenipotentiaries. But in devious ways and for ulterior purposes reports of secret proceedings frequently reached the printed page, garbled, perhaps, to advance the interests of those who instigated publication.

"The Big Four." In addition to running the conference machinery and determining final terms of peace, the members of the Supreme Council were burdened with complicated and urgent tasks of administration. Each leader had to consider public opinion and political developments at home, problems of demobilization and economic readjustment. The armistice terms with Germany had to be renewed, measures taken to combat the spread of Bolshevism, and to feed, clothe, and house refugees in a dozen regions of Europe. Eastern Europe was in chaos, Central Europe was in revolution, and Western Europe trembled on the verge of exhaustion and collapse Everywhere the various nationalist groups were attempting to anticipate the decisions of the Conference by seizing as wide an area of debatable territory as possible. At one time American observers counted as many as 14 small wars raging in various parts of Europe. The maintenance of political stability and the restoration of economic processes to more normal functioning had to be accomplished in the face of nationalistic quarrels and social unrest that threatened to plunge all Europe into renewed anarchy and to spread the tenets and tentacles of communism westward to the Rhine and the Adriatic.

The position of Woodrow Wilson and his American colleagues was at once highly advantageous and supremely difficult. Mr Wilson enjoyed great prestige as the head of a wealthy, powerful, and influential nation. The moving eloquence of his lofty declarations on the issues of the Great War and the principles of a lasting settlement together with his vigorous advocacy of a league of free nations coöperating in the fruitful processes of peace had earned him a numerous following among liberal and labor elements the world over. His programme for world settlement had been officially endorsed as the basis of peace at the time of the armistice negotiations, and he came to Paris determined to secure the application of the twin principles of national self-determination and international coöperation.

But speaking broadly one may say that the representatives of the other Allied Powers did not view with entire favor the policies of Mr. Wilson. They might with diplomatic tact, with reassuring cordiality, agree with Mr. Wilson "in principle," yet their manifest purpose was to negative his projects in detail. Throughout the long negotiations during the first six months of 1919 with the endless proposals and counter-proposals, discussions, and decisions, the central ideas of the leaders of the different delegations, except possibly the British, remained fairly consistent. Premier Clemenceau of France, in addressing the assembled plenipotentiaries on January 18, announced that the principles of the peace had been laid down by President Wilson and adjured all to work quickly and well. Yet there was not in Paris a more persistent or dogged opponent of Mr. Wilson's

ideals and policies than Clemenceau A statesman and politician of the realist school, steeled by half a century's experience in French politics, he was cynical of the idealism which had been so widely extolled. Being utterly convinced that the Germans understood nothing but force, he made no pretense of being bound by the Fourteen Points. His one interest was his beloved France and his one dominating purpose the demolition of Germany and the achievement of security for France. "The French position at Paris was set forth and defended with matchless ingenuity and obstinacy. . . . Foch had a military plan of safety, Bourgeois a diplomatic plan, Loucheur and Klotz an economic plan, but the coördination between them was perfect and Clemenceau was the supreme strategist of the entire campaign"

David Lloyd George, the leader of the British delegation, was perhaps the most unstable character at the Conference. No plenipotentiary ever approached the task of readjusting a shattered international order with a more slender equipment of detailed knowledge and though he possessed the capacity of acquiring effective information at lightning speed, he seemed to have no guiding principles Leaping nimbly from extreme to extreme—a human barometer charged with Celtic quicksilver—he seemed to live in constant apprehension of parliamentary repercussions Guided by the dictates of expediency alone, Lloyd George sought always to advance the interests of the British Empire, to prevent the French from getting too much, to render Germany incapable of offense by land or sea, to make her pay for the War up to the measure of her ability, and to surrender her war criminals, yet not to impose terms of such severity that the German government would refuse to sign. The surrender of the German fleet had already secured Great Britain in the supremacy of the seas and this the British determined to maintain. They had specifically reserved approval of Mr Wilson's Second Point relating to the "freedom of the seas" and it was a distinct concession to their susceptibilities that so little discussion of this subject took place at Paris. Outside of that the main interest of the British was in the disposition of the former German colonies and the dismemberment of the Turkish Empire Here their claims clashed both with rival French and Italian interests and with Mr. Wilson's principles. Subject to these modifications and exceptions the British tended to favor a League of Nations

Equally distrustful of the Wilsonian programme of peace and equally importunate in their demands for territorial cessions were the Italians represented in Paris by Premier Orlando and his foreign minister, Sidney Sonnino Though less powerful than their colleagues, these Italian delegates, supported by a strong nationalist and imperialist sentiment at home, determined to complete Italian national unification, obtain strategic security and imperial aggrandizement on the north and in the Adriatic, and share more largely, even though at French and British expense, in the political control and economic exploitation of Africa and Asia Minor.

The Japanese plenipotentiaries came to Paris with two major aims: first, a more complete recognition of the status of their nation as a Great Power on a plane of equality with the others, and second, acquisition of Shantung and the German islands in the North Pacific Ocean. Sphinx-like and reticent they participated but little in the resettlement of Europe, but where their own interests were involved they stood ready to fight for their claims even to the extent of threatening to leave the Conference.

In addition to these aims and interests of the Great Powers there was another grave obstacle to the realization of a Wilsonian peace, namely, the inordinate ambitions and conflicting claims of the smaller nations now newly vindicated, emancipated or unified The representatives of Belgium, Paderewski (the pianist premier of Poland), Bratiano of Rumania, Pasitch of Serbia, and the gifted Venizelos of Greece, all asked for territory which could only be assigned to them on the inveterate, but, to Wilson's mind, iniquitous principle of the division of the spoils among the victors. It was partly because of these overweening pretensions on the part of the smaller states that Wilson agreed to their exclusion from the Supreme Council of the Allies which directed the Conference.

The Russian Problem. The vexatious and long unsolved problem of Russia rose to confront the Supreme Council during the early weeks of the Conference The danger of Bolshevism loomed large on the Eastern horizon, for despite the ring of domestic and foreign enemies which surrounded them the Communists had managed to maintain their position Though they were generally regarded as traitors and outlaws, the inherent difficulties of the problem of dealing with them were rendered still more complicated by the divergent aims and sympathies of the Allies. Early in January, the French, mindful of the billions of francs which they had invested in Russia, urged the utilization of the combined resources of the several countries to overthrow the Bolshevist régime; but the United States and Great Britain refused to furnish any troops for this enterprise President Wilson strongly opposed Foch's plan for sending troops to Poland, saying he had great doubts whether the spread of Bolshevism could be checked by the use of armed force He and Lloyd George suggested a plan for holding a conference with the various Russian factions including the de facto Bolshevist government. Clemenceau refusing to have his capital contaminated, the place and date of meeting were set for the island of Prinkipo in the Sea of Marmora in February, but to the ill-concealed joy of the French the project fell through owing to the contemptuous refusal of the counter-revolutionary leaders Denikin and Kolchak to consider any proposal for a truce and a conference During the several subsequent months the British and the Americans, recognizing the danger of a policy of drift, persisted in their endeavor to make some sort of a settlement regarding Russia, but due to diplomatic tactlessness on the part of the Bolshevists, hostile comment in the Allied press, the vacillation of Lloyd George in the face of this comment, and the unbending rigor of official France, nothing was accomplished, and the Allies finally reverted to the policy of supporting the royalist counter-revolutionists. Much valuable time had been wasted and meanwhile the tide of Bolshevism seemed to be sweeping irresistibly westward, into Hungary, into Austria, into Bavaria The Conference lived throughout under the menacing shadow of impending revolution.

The League of Nations. One of the earliest and perhaps the most vital of the many struggles

at the Peace Conference was the effort to bring into being a League of Nations and relate it definitely to the Treaty of Peace. (See LEAGUE OF NATIONS.) The French were desirous of postponing consideration of a League until the material problems of peace had been settled—new states, boundaries, colonies, disarmament of the enemy, and indemnity. But Wilson placed the league project first on his list of subjects, and in compliance with his demand the Council of Ten passed a resolution on January 22, sanctioning the creation of a League which should be incorporated "in the general treaty of peace." This resolution was approved by the second plenary session on January 25, and a commission constituted to draft a covenant for the proposed league.

On January 23 Lloyd George, supported by Clemenceau and Sonnino, precipitated an acrimonious discussion of the disposition of the German colonies and the dismemberment of Turkey, which consumed the greater part of a week and generated much heat and bitterness. German sea-power and economic rivalry having been crushed, the British moved quickly to their next objective—the division of the spoils of war Wilson vigorously opposed the move, but had to compromise. It was agreed (January 24) that the colonies should not be restored to Germany, though on the question of future control grave differences of opinion developed. The British premier and the Dominion prime ministers demanded outright annexation of the territories which the secret treaties assigned to the British Empire. On the 27th, the Japanese announced their unconditional claim to Shantung and the North Pacific islands as per secret treaty engagements. On the 28th, the French demanded annexation "pure and simple" of Togoland and the Cameroons, basing their claims in part upon the existence of secret arrangements with Great Britain and requesting that France "be allowed to continue her work of civilization in tropical Africa." Belgium presently intimated a desire for territorial increases in Africa, and Italy put forward provisional claims based upon the secret treaty of London. Wilson adhering to his programme of "self-determination" with "no annexations" proposed that the areas in question should be held in "trusteeship by the League of Nations through the appointment of mandatories." Smuts of South Africa had originally proposed the application of the mandatory principle to the Turkish and Hapsburg Empires, but Wilson in adopting his suggestion widened its application, thereby incurring bitter attacks in the French press which denounced him and his "impracticable ideals." The British shifted their attack, accepted the mandatory scheme in principle and attempted to have a preliminary allocation of colonies made before the League came into existence. Hughes of Australia and Massey of New Zealand now uttered a virtual ultimatum, but Wilson stood adamant, and consideration of the problem was postponed pending the drafting of the League Covenant, work upon which was expedited during the first two weeks of February. Simultaneously other commissions which had been appointed, such as those on various territorial problems, responsibility for the War, reparations, etc., immediately commenced their arduous task of preparing the formulas of settlement.

Following the plenary session of February 14, there was a month's interregnum due to the absence of the "Big Four." Lloyd George was absent from the Conference from February 7 to March 5. His place was temporarily taken by Winston Churchill, perhaps the most militaristic and ultra-imperialistic member of the British cabinet. Mr. Wilson, who left for America on February 14, to attend to administrative duties, did not return to Paris until March 14. Premier Clemenceau, wounded by a French anarchist on February 19, was confined to his home until March 10. Premier Orlando went to Italy for some time leaving his more reactionary colleague Sonnino in control.

During the week before his departure, especially on February 7, and February 12, Wilson advocated the immediate imposition upon Germany of military and naval terms providing for her disarmament as a preliminary preparation for Allied demobilization. This would separate military terms from general considerations of peace and tend to remove the Conference from the militarist atmosphere created by the maintenance of large standing armies. Clemenceau bitterly denounced this plan. He desired expansion of the old conditions for Germany but not demobilization for the Allied armies. Balfour of Great Britain supported the President in resolutions renewing the old armistice terms for an indefinite period and providing for a preliminary treaty containing the military, naval and air terms to be drafted immediately by a committee of military experts during Wilson's absence in America. But those delegates who favored imposing general territorial and reparation terms on Germany before considering a League of Nations took advantage of the situation to sidetrack the League project and work for the expansion of the preliminary military, naval and air treaty authorized by the resolution of February 12, into a general settlement. On February 22, Mr. Balfour, responding to pressure by Churchill, introduced a new resolution providing for a preliminary peace treaty with Germany which should include, besides disarmament clauses, the approximate future frontiers of Germany, financial arrangements, post-war economic relations, and responsibility for breaches of the Laws of War. The various commissions which had been constituted to investigate these matters were directed to report not later than March 8 (one week before Wilson's expected return). This resolution received the cordial endorsement of the French and the Japanese. Baron Sonnino of Italy favored the principle though he was averse to having the German settlements made before Italian claims to Austrian territory were satisfied. Mr. Lansing and Colonel House of the American delegation, desirous of securing a speedy peace, acted against their absent chief's wishes and assented to the project. Lord Milner of the British delegation alone opposed the move, but in vain. The foes of the League secretly rejoiced at this victory, and it was openly declared that the League was shelved. On March 1, Marshal Foch presented a report on the military terms of the Treaty. No sooner, however, had the Council of Ten resolved to frame a general preliminary treaty of peace omitting the League than difficulties were encountered. All sorts of controversies began to crop out. The British and the French differed about the disposition of the German war vessels, the British and Japanese about former German cables. Lloyd George no sooner returned to Paris than he had a falling-

out with Clemenceau. To make matters worse, the Italians objected very vociferously to a quick peace with Germany which left Austrian problems in abeyance.

Such was the situation upon the return of President Wilson to Paris on March 14. In many respects his visit home had been discouraging, for he had learned that he could not count with certainty upon the American people's support of his peace programme Circumstances demanding decisive action on his part, the very next day he issued a strong proclamation repudiating American support of the scheme for a preliminary comprehensive peace settlement without the League and announcing that the resolution adopted at the second plenary session on January 25 to the effect that the League should be made an integral part of the general treaty of peace, was of final force

Reports of commissions—territorial and other —were now being received, but they had been prepared for the most part by subordinate members of the various delegations without supervision or direction on the part of the chief plenipotentiaries. The time was rapidly approaching when formal decisions had to be reached on questions on which it was known that grave differences existed among the various statesmen. Secrecy was deemed an essential condition for the arrangement of those compromises by which alone amity and unanimity could be preserved. Many complaints had arisen about the delay of making peace and the slow progress of the Conference seemed to necessitate a radical reorganization of the form and procedure of the Supreme Council Under pressure of the British delegates it was decided about the third week of March to substitute a Council of the Heads of the Four Great Powers of France, Italy, the United States, and Great Britain for the larger and more unwieldy Council of Ten Definite announcement of the change was made on March 25. Marquis Saionji, the head of the Japanese delegation might have claimed a seat in this conclave but abstained from so doing except when his nation's interests were specifically involved on the ground of his ignorance of European languages The foreign ministers who had been members of the Council of Ten henceforth met separately as a subordinate Council of Five to which was intrusted decisions on matters of secondary importance, preliminary preparation of miscellaneous material for the consideration of the Supreme Council of Four and the execution of numerous administrative tasks which had formerly consumed the time and energy of the old Supreme Council of Ten

From March 25 to May 7 the Four worked at high pressure to complete the German treaty. Meeting two or three times a day they decided questions of principle and high policy, consulting the experts on technical points and details of the subjects discussed. The intensified secrecy of their procedure reacted upon the press and public to produce considerable irritation and much confusion Its sole justification was that it concentrated power in the hands of responsible statesmen and promised a more expeditious settlement.

The French Demands. The somewhat cool reception which Wilson had encountered at home did not pass unnoticed in Europe Clemenceau and Lloyd George undoubtedly felt that Wilson's domestic support was so unstable that they who could point to the tangible popular mandates of victorious elections and votes of confidence were justified in adopting a stronger tone. These three chief conferees now faced in all its acuteness the problem of finding some basis of unity among themselves upon which the terms of the peace settlement might rest. In January Wilson had insisted upon immediate steps toward the creation of a League of Nations The French now resolved to carry through in its entirety their formidable programme of security, reparation, and expansion It embraced the following points: (1) French military control of the Rhine; (2) a permanent alliance of the Great Powers to help France hold it, (3) erection of a group of smaller allies to menace Germany from the East; (4) territorial reduction of the German Empire; (5) crippling of the German political organization through the encouragement of separatist movements; (6) disarmament of Germany but not of the Allies; (7) a crushing indemnity to cover not merely restoration of northern France but as much of the French war debt as possible, (8) appropriation of German economic resources; (9) a set of commercial agreements preferential to France, prejudicial to Germany In addition the French were determined to acquire a large share of the economic opportunities of developing parts of Turkey and the former German colonies

Wilson recognized that his programme of permanent world peace based upon sound moral principles backed by mutual guarantees was seriously jeopardized by the French demands He had upset many plans on March 15, by declaring that the League must be an integral part of the Treaty. He consistently opposed Marshal Foch's projects of sending military expeditions to coerce Soviet Russia, and on March 17, during the final consideration of the military, naval and air terms of the Treaty, caused the rejection of an elaborate scheme advanced by the French for perpetual control over the military and naval affairs of Germany. Shortly afterwards he was instrumental in again defeating, in the League of Nations Commission, the plan sponsored by M Bourgeois to make the League practically a military alliance for the defense of France. In addition, while on his way back to France he had refused, by wireless, to consent to the French proposal to include the entire costs of the War in Germany's reparations bill. Such actions, though maintaining his position, served to irritate and consolidate the opposition.

The French determined not to yield on any more points. Though unanimously assured of the return of Alsace-Lorraine, political, military, and economic motives impelled them to demand a more complete "rectification" of their eastern frontier The secret agreement of February, 1917, with Russia had assigned them, first, outright annexation of the entire iron district of Lorraine and the entire coal district of the Saar Valley, and, second, the separation from Germany of the remaining territories on the left bank of the Rhine and their erection into an autonomous neutral state to be occupied by French troops pending final fulfillment of all conditions of peace to be imposed upon the enemy With minor modifications the execution of their agreement together with a proposal for an indefinitely extended inter-Allied control of the Rhine bridges was vigorously advocated by the French delegation at the Conference, and the debate on this subject of fundamental importance was keen and protracted,

lasting off and on for the first six months of 1919. On March 14, Wilson and Lloyd George offered to pledge their respective countries to aid the French in case of an unprovoked attack by Germany. Clemenceau accepted this extraordinary guarantee with much gratitude, but insisted that it supplement rather than supersede the French plan for indefinite occupation of the Left Bank and military control of the Rhine. On March 27, the French finally presented their definitive claim to the Saar, pared down to an irreducible minimum providing first for political annexation of that part of the Saar basin which had belonged to France under the frontier of 1814 but had been relinquished to Prussia as an additional penalty after Napoleon's débâcle at Waterloo, and, second, for full French ownership of the mines in the adjoining regions. The whole controversy on this issue, together with disputes about reparation, amendments to the covenant of the League of Nations, and other points, came to a head late in March. From March 25 to April 7, the Conference seemed to have reached a standstill as the major plenipotentiaries battled for supremacy Affairs had reached an impasse

Working in supposedly strict secrecy, the Council of Four struggled frantically to discover some working arrangement. American experts had recommended granting a portion of the Saar region to France as compensation for the wanton destruction by the Germans of mines in northeastern France. Wilson readily acknowledged the validity of French claims to coal from the Saar, and was early convinced that transfer of the mines was the surest method of just compensation, but could not be brought to consent to French annexation of any part of the Saar or to political separation of the Left Bank from Germany. The British, though sympathetic with French desire for security, unrelentingly opposed a separate buffer state on the Rhine. As regards the Saar they favored the transfer of the mines but instead of direct annexation preferred the creation of a larger autonomous state under French protection To the anger of the French, Lloyd George, in a memorandum circulated on March 25, protested that the Treaty as it was being framed could only operate to cause new and more terrible wars in the future and made a strong plea for moderation and justice in territorial readjustments. Clemenceau in a biting and sarcastic reply complained that all of Lloyd George's proposed concessions were in military and European matters at the expense of French security, not in naval or colonial matters at the expense of British security or aggrandizement.

The opening days of April have truly merited the caption "the Peace Conference's blackest hour." In the Council of Four, Clemenceau was at loggerheads with Wilson and Lloyd George and threatened to resign unless his demands were granted. His fall would probably have resulted in an even more obstinate French resistance. In the sessions of the League of Nations Commission the French were insisting on the adoption of amendments favoring militarization of the League and the maintenance of French security There were grave premonitory rumblings of future disputes with the Italians and Japanese over their respective territorial claims. The inspired French press and certain sections of the English and Italian press uniting in a vituperative attack upon Wilson and to some extent upon Lloyd George, anathematized the former as a pro-German and the sole obstacle to a speedy and satisfactory peace. On April 3, the President succumbed to physical exhaustion and for four days was confined to his bed. On April 4, came news of renewed disorders and aggressive Bolshevist projects in Hungary; on the same day King Albert of Belgium arrived to insist upon Belgian priority in reparations payments. On April 5, it was learned that Bavaria had embraced Bolshevism and on the sixth there were socialist demonstrations in the streets of Paris

Wilson determined to force a showdown. His first action upon leaving his sick-bed was to order the *George Washington* to sail for Brest immediately. This was his ultimatum: either the French had to recede from their extreme demands or he would leave the Conference. The result was an era of compromise Working under the necessity of preserving Allied solidarity and preventing a disruption of the Conference, Wilson and Clemenceau gradually fought out the problems of French security and reparation. On April 10, a solution of the Saar Basin (q.v.) question was attained. The mines were to be given outright to the French, but politically the region was to be administered for 15 years by a special League of Nations Commission after which a plebiscite was to determine its future status. On April 16, Wilson and Lloyd George agreed to a 15-year occupation of the Left Bank of the Rhine, together with Allied control of the three principal bridge-heads, the demilitarization of all this territory and also of a zone stretching 50 kilometers east of the river. Simultaneously it was definitely decided to sign the three-power defensive alliance as an additional guarantee of French security, though in so doing, Wilson laid himself open to serious charges of inconsistency as he had hitherto opposed special alliances within the general family of the League of Nations Meanwhile in the final sessions of the League Commission, April 10 and 11, Wilson carried through certain American amendments that he considered necessary to meet domestic opposition but with Clemenceau's consent the proposed French amendments were rejected On April 12, a compromise was reached on the reparations issue (see REPARATIONS). These decisions in regard to reparations, the Saar Valley, and the Left Bank of the Rhine completed the main outlines of the settlement with France. Though the worst period of the crisis was thereby weathered the compromises on these vital issues satisfied no nation and extraordinary attempts were subsequently made to evade or modify them, for the French never stopped fighting for their full programme, and the British and the Americans, regretting their concessions, endeavored to secure a reconsideration. However, by April 14, sufficiently comprehensive agreements had been reached by Wilson, Clemenceau, and Lloyd George to justify summoning the German delegation to Versailles But three weeks were yet to elapse before the tentative draft treaty was completed and submitted to the enemy plenipotentiaries, for barely had the worst period of the French crisis been safely weathered when another storm—the Italian crisis—burst upon the Conference.

The Italian Demands. The Italians had been growing restive under the apprehension that the German terms would be settled before they had a chance to bargain for concessions in

the Adriatic, Asia Minor and elsewhere as the price of their approval of the settlement. Italian claims for territory were based primarily upon the secret treaty of London of April, 1915, by which Italy was promised the southern part of Austrian Tirol, up to Brenner Pass and including the Bozen district with some 200,000 Austro-Germans in addition to the ethnographically Italian region of Trentino; also Trieste; Gorizia, Gradisca, and Istria, a majority of whose inhabitants were Slavic; part of Dalmatia with all the best harbors except Fiume on the eastern side of the Adriatic; the town and district of Valona in Albania; the Dodecanese Islands in the Eastern Mediterranean, wholly inhabited by Greeks; imperialistic compensation in Africa and Asia Minor; and "a share of the war-indemnity." Subsequent secret arrangements, notably that of St. Jean de Maurienne in April, 1917, had elaborated prospective Italian gains in the Turkish Empire. The Treaty of London, as its terms gradually became known, had a poisoning and disillusioning effect all through the Balkans, and proved to be one of the chief obstacles to a speedy and satisfactory settlement at Paris. "More actual time was devoted by the Council of Four and other councils and commissions to the controversies which raged around this treaty than to any other single subject discussed." In a session of the Supreme War Council on Nov. 4, 1918, at the time of the armistice negotiations, Premier Orlando had made a reservation on Point Nine of Wilson's Fourteen regarding the readjustment of Italian frontiers "along clearly recognizable lines of nationality," but this was not incorporated in the note to Germany on November 5, on the ground that it concerned the peace with Austria-Hungary, not with Germany. The Italians not only refused to abide by the Fourteen Points, but went a step beyond the Treaty of London and claimed in addition the Port of Fiume, the annexation of which they had expressly, though it appears unwillingly, renounced in 1915 At that time it was agreed to offer Fiume to Croatia, Serbia, and Montenegro as compensation for certain sacrifices of Serbian territory to be utilized in enticing Bulgaria into the War on the side of the Allies The latter project falling through, Italy revived her claim to Fiume in order to secure undisputed economic domination of the Adriatic and to prevent any potential rivalry on the part of Jugo-Slavia.

The attitudes of the Big Three toward Italian aspirations were very divergent. Sympathizing with the Jugo-Slavs, Wilson desperately endeavored to attain settlements not only just in themselves but based upon a broad and generous programme of coöperation. Clemenceau and Lloyd George, entangled in the commitments of the secret treaties, tended to recognize the obligations they had thereby incurred though opposing undue greediness on Italy's part. The scholarly and impulsive Orlando and the grim-faced Sonnino, so dissimilar in temperament and training, lacked sufficient unity of purpose and method to secure any substantial diplomatic victory. Hitherto somewhat in abeyance, the Italian claims were taken up in real earnest about the middle of April. Experts of the various delegations prepared reports and recommendations. Wilson intimated to Orlando that he would accept the northern frontier assigned by the Treaty of London and also Italian annexation of Lissa and Valona, but demanded that as the natural outlet for the trade of Jugo-Slavia and Austria, Fiume should be made a free city within the Jugo-Slav customs area. Advocating the assignment of Dalmatia to Jugo-Slavia under guarantees protecting the rights of Italian minorities therein, he rejected a proposal subsequently made by Clemenceau and Lloyd George to award Fiume to Italy if she renounced treaty claims upon Dalmatia. From April 19 to 23, stormy discussions raged upon various phases of the problem. On April 20, Wilson read a memorandum setting forth his views which he proposed to publish if the Italians rejected all compromise. The British and French premiers approved the memorandum and Wilson evidently understood both of them to favor publication. On April 23, Orlando having refused to participate in any further deliberations until the question was settled in Italy's favor, Wilson caused a tremendous sensation throughout the world by publishing an appeal to the Italian people over the heads of their duly authorized representatives. The outraged Orlando threatened to go home and lay the matter before Parliament. To his surprise Wilson eagerly supported the proposal and to save their faces the Italians had to go, receiving cold comfort from Lloyd George and Clemenceau who informed Orlando in a secret memorandum that although against their better judgment they would stand by the Treaty of London they could not admit the justice of the Italian claim in Fiume. This second memorandum, if published, would have completely isolated the Italians, but due to Lloyd George's temporizing it was suppressed, and Italian public opinion skillfully manipulated to confuse the issues and injure Wilson. In the Supreme Council, Lloyd George pressed for compromise and concessions, bringing up the broad subject of spheres of influence in Turkey. But other problems required attention; it was necessary to go on with the work in hand. Though receiving a vote of confidence in his parliament on April 30, the Italian premier, recognizing the futility of further abstention from the proceedings, left Rome for Paris on May 5. The Adriatic question was still undecided. For its ultimate settlement, see FIUME-ADRIATIC CONTROVERSY

The Japanese Demands. Contemporaneously with the Italian crisis over Fiume, there had taken place a sharp encounter with the Japanese over Shantung. The Mikado's representatives had hitherto confined themselves largely to silent observation of the wranglings of other nations and to a protracted though fruitless effort to secure insertion in the League of Nations Covenant of the principles of racial equality. Smarting under their defeat on this issue, the Japanese began strenuously to urge their claims to imperialistic aggrandizement in the Far East. Their diplomatic position was well-nigh impregnable. A secret agreement with Great Britain of February, 1917, subsequently approved by France, Russia, and Italy, assured Japan of the acquisition of Germany's rights in Shantung, and island possessions in the North Pacific, those south of the Equator being assigned to the British. Several secret agreements negotiated with China at the point of the bayonet in 1915 and September, 1918, had secured reluctant Chinese assent to the Japanese plan for eventual restoration of Shantung to China only upon conditions favoring the enhancement of Japanese interests in Shantung and Manchuria. The

Chinese having consented to these arrangements only under duress (see CHINA, *History*, and JAPAN, *History*) now asked the complete abrogation of all these old treaties and the direct restoration of Shantung without the intermediation or interference of the Japanese. The Japanese, bitterly denouncing Chinese participation in the discussion of their claims, and grimly resolved to stand their ground, demanded the absolute surrender to themselves of the former German "rights, privileges and concessions" in Shantung, after which they were to be left free to carry out the provisions of the treaty of 1915 and the arrangements of 1918. They summarily rejected a proposal made by Secretary Lansing in the Council of Foreign Ministers on April 15, and strongly supported by President Wilson in the Council of Four, providing for the blanket cession of all German rights in China to the Allied and Associated Powers for subsequent disposition. Lloyd George adduced the secret treaty of 1917 in justifying the Japanese claims, but his loosely made suggestion for a League of Nations mandate for Shantung was rebuffed by them. The Japanese peremptorily demanded an immediate and definite settlement of the problem in accordance with their stipulations since otherwise they had strict orders from home not to sign the treaty. The departure of the Italians redoubled the gravity and effectiveness of their threat to leave the Conference. The Belgians were simultaneously manifesting discontent over the reparations settlement and a complete break-up again seemed imminent. Against the strong advice of his advisers and fellow-plenipotentiaries, including Secretary Lansing and General Bliss, Wilson finally decided to yield to the practical considerations of the moment and on April 30, it was agreed that Shantung should be ceded to Japan in the actual Treaty, but that Japan in a supplementary verbal agreement was specifically to reaffirm her promise to return it to China under more explicitly defined conditions. This compromise solution saved the day, but was satisfactory to no one except the Japanese It embittered the Chinese and led to their refusal to sign the treaty. It disheartened Wilson more than any other decision at the Conference. It stirred up great criticism in America and furnished a formidable weapon of opposition to the Treaty there. Not until the time of the Washington Conference was an amelioration of the settlement made which mollified the United States and China. (See SHANTUNG and WASHINGTON CONFERENCE.)

The Polish Demands. On the contentious issues of Fiume and Shantung, Wilson received scant support from his colleagues in the Council of Four, but when it came to the extravagant Polish demands supported by the French, Lloyd George entered the diplomatic lists in the guise of an embattled advocate of justice and moderation. In 1917 France in her secret arrangements with Russia had agreed to allow the Czar's government a free hand in drawing Germany's western boundaries, i.e. in annexing Prussian and Austrian Poland. But the advent of revolution in Russia and the subsequent régime of the Bolsheviks profoundly altered French policy. Having lost their powerful ally in the East and being interested in the creation of a ring of buffer states around Germany, the French argued for a great and strong Poland, which would not only hem in the Germans on the East but also form a link in the *cordon sanitaire* to be forged around Bolshevist Russia. The British, while committed to the restoration of Polish statehood, refused to countenance the projects of aggrandizement advanced by the Poles and the French, as they served no direct British interest and promised to cause unrest and possibly war in Eastern Europe. The Territorial Commission appointed to consider the problem of Poland recommended the cession to her of almost the whole of the Provinces of Posen and West Prussia which had anciently constituted parts of the Kingdom of Poland, together with the district of Marienwerder controlling the railroad from Danzig to Warsaw. Poland was also to get the greater part of Upper Silesia, which had not been Polish for centuries. Mr. Lloyd George strongly opposed the transfer of 2,000,000 Germans to Polish rule and, supported by President Wilson, he secured a decision allowing a plebiscite in Marienwerder, and making Danzig a free city under the League of Nations though subject to Poland in customs regulations and conduct of foreign relations.

The essential terms of the treaty were now complete. On April 28, at the fifth plenary session, the League of Nations Covenant and the International Labor Charter were adopted by the Conference, and on May 6, despite a strong undercurrent of dissatisfaction among the smaller powers "with special interests" who felt that their views had not been sufficiently considered, a summary digest of the whole treaty was read and approved

German Reception of the Treaty. Headed by Count Brockdorff-Rantzau, foreign secretary of the republican government at Berlin, the German plenipotentiaries arrived at Versailles on April 29. Here, on May 7, the Preliminary Conference was transformed into a definitive Peace Congress and at a ceremonial meeting the proposed treaty was formally transmitted to the German delegation by Clemenceau whose tart speech declaring that the war had cost the victors too much to allow the remission of any precautions or guarantees necessary to ensure a lasting peace, elicited from Brockdorff-Rantzau an extremely defiant and tactless reply marked by bitter denunciation of the Allies and a vigorous denial that Germany was solely responsible for the war.

Seven weeks of uncertainty ensued, taken up with the analysis of German protests, the formulation of the Austrian peace treaty (see below), and the last great crisis that preceded the signature. Oral discussion being barred, the Germans, commencing May 10, submitted an extended series of notes criticizing various parts of the Treaty, and on May 29 advanced an elaborate set of counter-proposals. Complaining that the principles of the Armistice under which Germany had laid down her arms had been violated in letter and spirit, they asserted that the terms imposed upon their now thoroughly democratic government were intolerably severe. They demanded a plebiscite to determine the future status of Alsace-Lorraine, and suggested that instead of ceding West Prussia, Danzig, and Memel they should be allowed to make Danzig, Königsberg, and Memel free ports under German sovereignty. They offered fixed annual supplies of coal to France in lieu of the Saar mines and argued that the retention of Upper Silesia was absolutely necessary if Germany were to fulfill her obligations. They requested

that Germany be admitted to the League of Nations immediately without conditions, and proposed that she retain her colonies under a League mandate. They advocated general instead of unilateral disarmament and asked the Allies to abolish compulsory military service in two years.

These and numerous other suggested changes and interpretations were considered by the Allied Councils and 13 special committees Of great significance was an eleventh-hour attempt on the part of Lloyd George to secure modification of the terms of peace. Publication of a digest of the treaty had elicited vociferous denunciation of its provisions in liberal and labor circles in Great Britain and to some extent in the United States Certain plenipotentiaries and experts in the British and American delegations at Paris were emphatic in their criticisms Mr. John Meynard Keynes, a financial adviser on the British staff, resigned in protest, as did likewise Mr. William C. Bullitt of the American commission. In Germany all parties denounced the treaty and huge demonstrations of protest led to increasing anxiety about its possible rejection Alarmed by the spread of dissatisfaction and fearful lest the Germans would refuse to sign, the consummate politician, Lloyd George, who on May 9 had been stronger than any of the others for coercion, swung suddenly toward the other extreme and began to demand somewhat radical revisions of the Treaty. He particularly attacked the provisions regarding the army of occupation and the Silesian settlement Clemenceau criticized in France for having already yielded too much, convinced as always that the Germans understood nothing but force, and believing that once a few concessions were made they would insolently demand more, bristled with opposition and refused to agree to a reconsideration Lloyd George turned to the Americans for support Wilson having struggled all through the Conference to abate excessive British, French, Italian, Japanese, and Polish demands, was not impressed by the British premier's periodic conversions to wisdom and sanity. On June 1, Lloyd George consulted his cabinet at a special meeting convened in Paris, and the very next day he threatened to go home and lay the whole matter before Parliament if Clemenceau did not consent to changes. The French premier, himself facing a ministerial crisis, declined to budge. Wilson, at a special meeting of the American delegation on June 3, announced that he was strongly in favor of making any changes that would ensure more complete justice, but he opposed granting any last minute concessions merely to placate the enemy. He feared that the resumption of conversation about French security and other points would imperil the whole delicate structure of the settlement. With the President's consent the American experts did urge that a definite and moderate sum of reparation be fixed; but Lloyd George, remembering his election pledge about recovering the costs of the war—some $120,000,000,000—frankly opposed the move. On June 16, however, he secured a convention providing for supreme civil rather than military control of the occupied territory and a declaration limiting the cost of the Army of Occupation to be assessed upon the enemy The Allied reply to the German observations on the conditions of the Peace which was dispatched on the same day, registered certain additional modifications including the requirement of a plebiscite for Upper Silesia, a slight readjustment of Poland's western frontier, a retardation of the required reduction of the German army, and a provision for the collaboration of a German commission in discussing methods of reparation payments. Despite these concessions the Allied reply was in effect an ultimatum calling for Germany's acceptance or refusal on or before June 23.

The return of the German delegates from Versailles with the modified treaty conditions precipitated a ministerial crisis at Berlin The Scheidemann government which had fomented resistance to the treaty, and threatened not to accept it, resigned on June 21, and was replaced by a transitional ministry under Adolph Bauer pledged to acceptance of the treaty An effort to secure the omission of the articles requiring the confession of war guilt and the surrender of war criminals met with an absolute refusal by the Supreme Council to consider any further modifications and a demand for immediate compliance Marshal Foch was ordered to advance on Berlin with the Allied armies should the German government not submit within the time limit, and preparations were made for tightening the blockade. The Germans reluctantly gave way. On June 23, the National Assembly at Weimar voted 237 to 138 to accept the treaty unconditionally and the next day the Allied Supreme Council was informed of the fact. Dr Hermann Muller, the new foreign secretary, and Dr Johannes Bell, colonial secretary, were prevailed upon to act as plenipotentiaries in place of Brockdorff-Rantzau and his colleagues. On June 28, 1919, five years to a day after the assassination of the Austrian Archduke Francis Ferdinand, the two representatives of the new German Republic attached their signatures to the Treaty of Versailles which, being signed by the delegates of all the Allied nations except China, officially terminated the Great War.

Attacks on the Treaty. The Treaty of Versailles met with a mixed reception in all quarters of the world. It was no peace of reconciliation—in some respects it was a peace of vengeance, for the legacy of hatred left by the war had proved exceedingly potent There were liberals and radicals everywhere who vehemently assailed the Treaty as an "iniquitous document," a surrender to the forces of reaction, "a crime against civilization"; there were nationalists, and imperialists and militarists in every country who scored the leniency of the terms and denounced their respective plenipotentiaries for sacrificing legitimate national interests in return for vague assurances of international cooperation. Many Frenchmen were incensed because their demands for a Rhine frontier had been negatived; certain Belgians complained about the failure of the Conference to arrange to have Holland cede them the left bank of the Scheldt; the great mass of Italians were embittered by the defeat of some of their more extreme projects of aggrandizement in the Adriatic; the Chinese, as we have seen, refused to sign the Treaty because of the unjust Shantung settlement. General Smuts of South Africa, while attaching his signature, openly protested in Wilsonian phraseology against the severity of the terms. Mr. Wilson himself, who had struggled so sincerely for a settlement of a different type, now became an ardent defender of the Treaty, being convinced that it was the

best obtainable under the circumstances. The Treaty was perforce promptly sanctioned by the German National Assembly, which ratified it on July 7. Most of the other nations accepted it at intervals throughout the year, and on Jan 10, 1920, an exchange of ratifications between the Allies and Germany was effected at Paris But among the Great Powers the United States conspicuously abstained from ratifying the treaties and eventually made a separate peace settlement with Germany. (See UNITED STATES, *History*) Thus the three-power defensive pact with France and Great Britain for the maintenance of French security which was signed at the same time as the Versailles Treaty lapsed, for although the Anglo-French treaty had been ratified by the British it was not to come into effect until the ratification of its Franco-American counterpart.

THE TREATY OF VERSAILLES

The Treaty of Versailles, as signed on June 28, 1919, revolutionized the international status of Germany, territorially, politically, militarily and economically. By its terms Germany lost her navy, her merchant marine, her colonial empire, invaluable natural resources; and her army was reduced to impotence. The first 26 articles of the Treaty constituted the Covenant of the League of Nations, but from this Germany was to be temporarily excluded. (See LEAGUE OF NATIONS.) The rest of the large-sized volume of 440 articles and annexes set forth more specific conditions of peace.

Political Terms. Germany recognized the complete independence and unconditional sovereignty of Belgium, Poland, Czecho-Slovakia, and German Austria, denounced the treaties of Brest–Litovsk and Bucharest, and agreed to allow the Allies carte blanche in dealing with Russia, Turkey, Bulgaria, Hungary, and Austria.

Territorial Terms. Germany lost all of her overseas possessions and some 27,500 square miles, or a trifle over 13 per cent of her European domain. Alsace-Lorraine (q.v.) was returned to France, and the Saar Basin (q.v.) placed under a League of Nations Commission for 15 years as described above. Belgium received the small districts of Eupen (q.v.), Malmédy, and Moresnet. Under plebiscites held in February and March, 1920, to determine the status of Northern and Central Schleswig (q.v.), the former, comprising some 1537 square miles, was reunited with Denmark, but the latter remained with Germany. To Poland were ceded large parts of the provinces of Posen and West Prussia. In July, 1920, plebiscites in southern East Prussia and the Marienwerder (q.v.) district of West Prussia produced very substantial majorities for Germany. The plebiscite in Upper Silesia (q.v.) in March, 1921, gave a majority for Germany, but to the disappointment of the Germans, in October, 1921 the Council of the League of Nations, having been invited to settle the controversy, awarded the richest part of the region, some 12.55 square miles, to Poland. A small portion, 110 square miles, of Upper Silesia was ceded to Czecho Slovakia on July 28, 1920. The port of Memel (q.v.) with adjacent territory was ceded to the Allies for ultimate transfer to Lithuania. The port of Danzig was likewise ceded to the Principal Allied and Associated Powers, who in accordance with the agreement described above recognized Danzig as a free city administered under the League of Nations but subject to Polish jurisdiction as regards customs and foreign relations Germany renounced all special rights and privileges in China, Egypt, Siam, Siberia, Morocco and Turkey Her rights and privileges in Shantung were ceded to Japan (See WASHINGTON CONFERENCE for eventual Japanese settlement with China.) Germany ceded to the Principal Powers all of her remaining overseas possessions which in accordance with Article 22 of the League of Nations Covenant were to be administered by the mandatories of the League. Already on May 6, 1919, the Supreme Council had made a provisional distribution of mandates Great Britain was to receive German East Africa On May 30, however, the British government resigned to Belgium the districts of Urundi and Ruanda contiguous to Belgian Congo to be administered under separate mandate German Southwest Africa went to the British dominion of South Africa. France and Great Britain were to receive a joint mandate over Cameroon and Togoland with permission to partition them by mutual agreement German New Guinea was assigned to Australia, German Samoa to New Zealand, the island of Nauru to Great Britain, and the German islands north of the Equator to Japan. On Feb 21, 1921, President Wilson announced that the United States could not agree to have the cable centre on the island of Yap (q.v.) assigned to Japanese control and a new arrangement in regard to it was made at the time of the Washington Conference. (For account of the mandatory system see MANDATES and also LEAGUE OF NATIONS.)

Military Terms. Germany was required to abolish compulsory universal service; to reduce her army to 96,000 men and 4000 officers recruited by voluntary enlistment, to demilitarize all the territory on the Left Bank of the Rhine and also that on the right bank to a depth of 150 kilometers; to stop all importation, exportation, and nearly all production of war material; to limit her navy to six battleships, six light cruisers, and 12 torpedo boats, with no submarines, the naval personnel not to exceed 15,000 officers and men; and to abandon all military and naval aviation by Oct. 1, 1919. The execution of most of these provisions was to be supervised by an inter-Allied Commission of Control endowed with full powers of inspection and investigation. (See below, *Continuation Conferences*) In addition, she agreed to demilitarize the island of Helgoland, to open the Kiel Canal to all nations, to surrender her 14 submarine cables, and, last but not least, to permit the trial of her ex-Emperor by an international high court on the charge of "a supreme offense against international morality," and of other officials for violation of the laws and customs of war.

Economic Terms. The economic and reparation provisions of the Treaty were exceedingly drastic and constituted a perplexing problem which more than any other aspect of the Treaty of Versailles has subsequently disturbed the peace of the world. (See REPARATIONS.) In addition to paying heavy indemnities the Germans were required to grant nonreciprocal most-favored-nation treatment to the commerce of Allied nations for a period of years. As guarantees for the payment of reparations the

Allies were to maintain military occupation of the Left Bank of the Rhine and of the bridgeheads at Cologne, Coblenz and Mainz, with provisions for the evacuation of the latter three districts at five year intervals should Germany be duly fulfilling her obligations. Including the Saar Basin (742 square miles) a total area of 12,338 square miles was to be occupied by the Allies and the subsequent seizure of the Ruhr by the French in 1923 added nearly a thousand more.

THE AUSTRIAN TREATY OF ST. GERMAIN

With the signing of the Treaty of Versailles with Germany on June 28 the major task of the Peace Conference was concluded, and the most important plenipotentiaries except Premier Clemenceau departed from Paris leaving subordinate statesmen and diplomatists in charge Mr. Lansing, succeeding Mr. Wilson as head of the American delegation, stayed until July, when he withdrew, leaving Mr. Polk, Under-Secretary of State, to act for him. Mr. Balfour became the chief of the British delegation, but in September he, too, departed, surrendering the headship to Sir Eyre Crowe. Premier Orlando's cabinet had fallen from power on June 19 as a result of Italian dissatisfaction over the Adriatic negotiations and his successor, Signor Nitti, refrained from visiting Paris.

Claims of the Succession States. Although giving priority to the settlement with Germany during the first six months of 1919, the Peace Conference had simultaneously taken under consideration the problem of arranging terms of peace with Austria, Hungary, Bulgaria, and Turkey. It was planned to have the five treaties form part of the same general settlement, each beginning with the League of Nations Covenant, and employing as far as possible the same form and phraseology The second treaty to be drafted and signed was that with Austria. Italy was the only Great Power with vital interests at stake, although France was insistent on preventing the union of Austria with Germany and carried her point during the era of compromise following the French crisis in April She also favored a confederation of satellite states on the Danube to act as a bulwark against Germany in the southeast. To the numerous other "heirs of the Habsburgs," however, Czecho-Slovakia, Poland, and the Balkan Allies, the disposition of Austrian territory was of supreme importance. As a result of the nationalistic revolution in the Dual Monarchy, the division had already taken place along broad lines by the time the Peace Conference met. But problems of frontiers still remained, some of which occasioned most violent conflicts. In Silesia, Poles and Czechs struggled for the control of the district of Teschen with its invaluable coal mines. (For discussion of this problem see TESCHEN.) In the Adriatic, Italians and Jugo-Slavs came to swords' points over Dalmatia. In the Klagenfurt Basin, Italians, Jugo-Slavs, and German Austrians were ready to come to blows. The conflicting claims and charges of the various litigants, each of which viewed affairs through the colored prism of its own nationalistic ambition, rendered extremely difficult the task which confronted the Supreme Council as regards Austria in the spring of 1919. Despairing of having the disputants arrive at amicable agreements among themselves, the Council of Ten constituted territorial commissions in February, 1919 to study the boundary problems of the various states except Italy. By the time the reports of these commissions were ready the Council of Four had superseded the Ten and with few exceptions the unanimous recommendations of the commissions were approved without alteration. Over points in dispute the Four worked earnestly, paying little attention to the small states. President Wilson finally acknowledged Italy's claim to the Brenner frontier, involving though it did the expatriation of over 200,000 Germans. The approximate boundaries of Czecho-Slovakia and Jugo-Slavia were settled during May, the former being assigned regions of Bohemia inhabited by 3,000,000 Germans, the transfer being dictated by economic and strategic considerations.

Work was rushed on the Austrian treaty so that it might be in the hands of the Austrians before the treaty with Germany was signed, for each contained the provision prohibiting union of Austria with Germany, each was to contribute to the territorial resurrection of Poland, and last but not least, Italians were insistent upon a simultaneous settlement with the two countries. An incomplete draft of the treaty was presented to the seventh plenary session with the intention of communicating it to the Austrians on the following day but the plenipotentiaries of the Succession and Balkan States demanded time to study the document. Two days later at the eighth plenary session, Premier Bratiano of Rumania supported by the Polish, Czecho-Slovak and Jugo-Slav representatives protested against having the Great Powers prescribe regulations for the protection of minorities within their separate states. Mr. Wilson answered that the Principal Powers could not be expected to guarantee the independence and integrity of the new states unless the latter would on their side guarantee equality of rights to racial or religious minorities transferred to their control under the peace settlement. Rumania and Jugo-Slavia, though greatly enlarged by the new readjustments, were old states and denied the right of the Conference to limit their sovereignty by special restrictions. Mr. Venizelos of Greece suggested that a joint meeting of the Council of Four with the smaller Allies ought to be held to consider the legitimate anxieties of the latter. But all objections were overruled by Clemenceau, Lloyd George, and Wilson. The Austrian delegates had arrived at St. Germain near Paris on May 14, and on June 2, the preliminary draft of the treaty was transmitted to them. On July 20, the Supreme Council transmitted a more complete and revised draft of the treaty to the Austrians, informing them that Burgenland or German West Hungary for whose annexation they had asked would be ceded without a plebiscite. (See BURGENLAND.) The Austrians formulated and presented their observations on the revised terms on August 6, still protesting against the patent violations of the principle of self-determination. In their final reply of Sept. 2, 1919 the Allied and Associated Powers made few additional concessions—perhaps the most noteworthy being the return to Austria of the important railway junction of Radkersburg originally assigned to Jugo-Slavia. On September 8, the Austrian National Assembly authorized its delegates to sign the treaty, and this ceremony took place at St. Germain on September 10. But the opposition of Rumania and Jugo-Slavia to acceptance of Minorities Treaties to which they

would have pledged themselves by underwriting the Austrian treaty led them to refuse to sign, until some time later. Though the Austrian National Assembly had already perforce ratified the Treaty of St. Germain on October 17, ratifications were not exchanged until July, 1920.

Political and Military Terms. The Treaty of St. Germain required Austria to recognize the complete independence of Jugo-Slavia, Czecho-Slovakia, Poland and Hungary, to make liberal cessions of territory to various victorious neighbors including Italy, and to accept elaborate regulations for the protection of such racial, religious, or linguistic minorities as remained within her much-diminished territorial confines. As described above the cession of lands to Italy included not only *Italia Irredenta* but also for strategic reasons the Brenner Pass frontier in the Tirol with about 250,000 German inhabitants. One-fourth of the inhabitants of the new state of Czecho-Slovakia were Germans in Bohemia and Moravia, this violation of the principle of self-determination being motivated by economic and strategic considerations and justified on historical grounds. Eastern Galicia, inhabited by a Ruthenian majority with a strong Polish minority, had been bitterly contested between these two nationalities, and had been seized by the Poles during the Conference; it was renounced by Austria in favor of the Principal Allied and Associated Powers, who acquiesced in Poland's de facto possession of the region, without definitively settling the question of sovereignty. The Duchy of Bukovina, with 300,000 Ruthenian and 273,000 Rumanian inhabitants, was renounced by Austria in favor of Rumania. As a result of the Klagenfurt plebiscite of October, 1920, the whole of that much-contested area remained Austrian. An additional solace was the award of German West Hungary (Burgenland). Thus through revolution and dismemberment the state of Austria shrank from its pre-war expanse of 116,000 square miles to the diminutive area of 32,000 square miles. The Austrian army was reduced to 30,000 men recruited by long-term voluntary enlistments; military aëronautics were prohibited; all war vessels were surrendered and future maintenance of naval forces obviated through loss of maritime ports. Commercial clauses of general similarity to those in the Treaty of Versailles were imposed upon Austria. She was guaranteed free access to the Adriatic. A commission on which Great Britain, France, Italy, Rumania, and the riparian states were represented was established to regulate traffic on the Danube. All transferred territories were made responsible for their fair shares of the pre-war Austrian debt. Austria was obligated to pay such indemnities as might be prescribed by the International Reparation Commission, but so crippled was the new republic politically, industrially, and commercially that in a few years intervention by the League of Nations proved necessary to straighten out her finances (see LEAGUE OF NATIONS; AUSTRIA; REPARATIONS).

THE BULGARIAN TREATY OF NEUILLY

Following the settlement with Austria, the Supreme Council devoted more attention to the task of arranging peace with Bulgaria—the first of the Central Powers to lay down its arms at the end of the Great War. The protracted delay which intervened between the arrival of the Bulgarian delegation on July 26 and the formal presentation of a preliminary draft of their treaty on Sept. 19, 1919, led to considerable exasperation on the part of their truculent leader, M. Theodoroff Learning the substance of the treaty conditions from the press he lodged strenuous objections with the Supreme Council on September 2, denying that Bulgaria was the one "guilty, imperialistic and aggressive nation" in the Balkans and protesting against the violations of the principle of self-determination prefigured in the proposed dismemberment of Bulgaria. These objections to the territorial terms were reiterated in the formal observations submitted on October 24. The Bulgarians also complained about their exclusion from the League of Nations and demanded changes in the military provisions so as to permit the retention of conscription. The reply of the Supreme Council on November 3 promised speedy admission to the League but otherwise made no substantial concessions. Further remonstrances from the Bulgarians had no effect other than the issuance of an ultimatum on November 5 demanding acceptance or rejection in ten days. Meanwhile in Bulgaria a general election held in August had resulted adversely to the government and a new ministry recruited from the Agrarian party under the leadership of M. Stambulisky came into power in the midst of the agitation about the treaty. On November 13 the Bulgarians still protesting yielded to superior force. Premier Stambulisky declared that he had "no illusions" and would sign "even a bad peace." He was the sole signatory for Bulgaria when the Treaty was signed at Neuilly on November 27. Jugo-Slavia and Rumania were not permitted to sign until they had accepted the Minorities Treaties supplementary to the Austrian Treaty. Ratifications of the Treaty of Neuilly were exchanged on Aug. 9, 1920.

Many clauses of the treaty were identical with those of the Treaties of Versailles and St. Germain, notably the League of Nations Covenant, the Labor Convention, aëronautical provisions, penalties, etc. Politically, Bulgaria was required to recognize the independence of Jugo-Slavia, to renounce the benefits of the Treaties of Bucharest and Brest-Litovsk and to accept regulations for the protection of racial, national, religious, and linguistic minorities. Territorially, Bulgaria was deprived of most of her gains resulting from the Balkan Wars and all of her conquests made during the Great War. The Dobruja went to Rumania, as before 1914, leaving for future consideration the problem of inducing Rumania to relinquish such Bulgarian districts as it included. Thrace was ceded to the Principal Powers for ultimate assignment to Greece. Particularly embittering to Bulgaria was the loss of the small districts of Tsaribrod, Bosilegrad, Strumitsa, and Timok Valley—all predominantly Bulgarian but all transferred to Jugo-Slavia for strategic reasons. Jugo-Slavia had suffered grievously from Bulgarian attack and domination during the recent war, and in the bitterness of retaliation demanded other territorial annexations, but these were denied to her on ethnographic grounds. A small district of former Turkey was added to Bulgaria on the southeast. Bulgaria was obliged to abandon conscription, to reduce her army to 20,000 officers and men together with gendarmes and other police to a number not exceeding 13,000.

All war vessels except four torpedo boats and six motor boats were to be surrendered or destroyed, military aëronautics prohibited, and the manufacture of munitions strictly limited. In addition Bulgaria was to pay extensive reparations (two and a quarter billion gold francs in 37 years), supply live stock for devastated areas, and ship large allotments of coal to Jugo-Slavia annually for five years. Commercially, she agreed to give the Allied and Associated Powers most-favored-nation treatment and freedom of transit for goods and persons, receiving in return the guarantee of freedom of transit to the Ægean with which her territory was no longer contiguous.

THE HUNGARIAN TREATY OF TRIANON

The conclusion of peace with the Hungarian wing of the old Habsburg Dual Monarchy was a protracted and difficult task, complicated alike by perplexing boundary disputes among the victors and by political instability and intransigeance upon the part of the vanquished. The democratic republican régime established in Hungary by the revolution of November, 1918, was supplanted in March, 1919, by a Bolshevist dictatorship on the Russian soviet model just at the most critical moment of the Paris Peace Conference (See above) The communist leader, Bela Kun, defied the Supreme Council during the crucial months of April, May, and June However, due to the exigencies of diplomacy and the nationalistic ambitions of the Balkan Powers, early decisions were arrived at regarding the territorial dismemberment of Hungary. Great difficulty was encountered in reconciling and adjusting the divergent interests and conflicting claims of Jugo-Slavia and Rumania. The secret treaty of August, 1916, which purchased Rumania's entrance into the Great War proved a source of much bickering and bitterness Premier Bratiano of Rumania asked for the complete fulfillment of treaty stipulations, but the Big Four, arguing that all previous commitments were cancelled by Rumania's signature of the Treaty of Bucharest in May, 1918, refused to accede to his demands The Banat of Temesvar (q.v.) all of which had been assigned to Rumania by the Treaty of 1916, was now partitioned between her and Jugo Slavia Despite reiterated Rumanian claims and objections the terms of this settlement were definitely arranged in June, 1919. On June 13 the Supreme Council informed the Hungarians of the proposed cessions of territory to Rumania, Jugo-Slavia, and Czecho-Slovakia, and on July 20 as recounted above the rich district of Burgenland (German West Hungary) was promised to Austria. (For Hungarian political developments during this period, see HUNGARY.) On January 7 the Hungarian delegates, after the establishment of a home government satisfactory to the Supreme Council, arrived at Trianon, France, and here January 15 they were formally presented with a preliminary draft of their treaty the main terms of which had been ready as early as September, 1919.

Council of Ambassadors. One week later —on January 21—the Supreme Council convened for the last time and the Peace Conference of Paris was thus formally dissolved approximately one year after its sessions had begun To the Council of Allied Ambassadors in Paris was intrusted the task of completing the settlements with the remaining enemy powers of Hungary and Turkey though periodic conferences of the Allied premiers were shortly to be inaugurated for the purpose of dealing with other unliquidated problems of the peace. (See below: *Continuation Conferences.*)

On February 12, the Hungarians submitted a set of observations and counter-proposals which breathed a spirit of hostility and recalcitrance. They demanded the retention of the Czechlers (Magyars) of East Transylvania, and asked that no territories be transferred without plebiscites according the inhabitants the right of self-determination. All transferred territories were to be retained in the Hungarian customs régime for a period of years, and better safeguards provided for the protection of Hungarian minorities. The Allies were in no mood to make concessions. The strong reactionary nationalist and monarchist sentiment rampant in Hungary elicited a joint statement from Great Britain, France, and Italy on February 12 to the effect that a Habsburg restoration would ipso facto violate one of the fundamental conditions of the peace settlement and call forth condign punishment. The new parliament elected early in 1920 designated Admiral von Horthy as "Protector of the Magyar Republic" but despite the emphatic pronouncement of the Allies the monarchical character of the constitution was reaffirmed on March 23 Hungary was a kingdom without a king Such being the situation the requests of her delegates for more moderate treatment met with scant consideration. The reply of the Council of Ambassadors on May 6 contained but slight alterations though it was asseverated that the League of Nations would be free to make such minor modifications of boundaries on ethnological or economic grounds as the future might reveal as feasible or desirable. The treaty was formally signed at Trianon on June 4. Hungary ratified the treaty on Nov 13, 1920 and was admitted to the League of Nations in September, 1922

The Treaty of Trianon duplicated the main features of the Austrian treaty except as regards territorial adjustments By its terms Hungary was transformed from a maritime, imperialistic country of 125,000 square miles into a landlocked fourth-rate power of some 35,000 square miles On all sides liberal cessions were to be made to neighboring states The region of Slovakia on the southern slope of Carpathian mountains, though containing a large minority of Magyars, was incorporated in the new state of Czecho-Slovakia for economic and strategic as well as ethnic reasons To Rumania was assigned Transylvania with its compact Magyar minority in the East A broad strip of Hungarian plain was also detached to secure Rumania's railroad communications with the Danube. Of the much contested Banat of Temesvar (q.v.) Jugo-Slavia received the county of Torontal in the west, the remainder going to Rumania. Jugo-Slavia also received Croatia-Slavonia, Bosnia and Herzegovina Fiume (q v) was renounced, to be disputed by Italy and Jugo-Slavia. Likewise to Czecho-Slovakia, almost purely for strategic reasons, was given the region called sub-Carpathian Ruthenia, autonomy being stipulated for the benefit of the 572,000 inhabitants To Austria was renounced the region of Burgenland (see above) Hungary was precluded from alienating her independence except with the consent of the League Council. Compulsory military service was abolished and her army was reduced to 35,000 men together

with police to a number not exceeding 31,500. She was required to pay a reasonable sum of reparations before May 1, 1921 and such total sums in sixty semi-annual installments thereafter as might be decided upon by the Reparations Commission. All of her merchant shipping and up to 20 per cent of her river fleet were to be surrendered, an indefinite quantity of live stock was to be furnished for devastated countries; and Jugo-Slavia was to be supplied with annual allotments of coal for five years. Deprived of two-thirds of her territory and population, crippled economically and surrounded by more or less hostile states, Hungary yet constituted a potent menace to the future peace of the Balkans. Three million Magyars, now aliens in adjacent countries, created a new irredentist problem so dangerous that in 1920 the Succession States of Czecho-Slovakia, Jugo-Slavia and Rumania formed the so-called "Little Entente" to meet it—an alliance calling for the indefinite maintenance of standing armies to guard against the restoration of the Habsburgs or Hungarian war of revenge. (See LITTLE ENTENTE.)

CONTINUATION CONFERENCES, 1919–1924

The Paris Peace Conference, as we have seen, adjourned on Jan 21, 1920, before the Hungarians had decided to accept their treaty and before the Adriatic question including the problem of Fiume and the disposition of Dalmatia, Albania, and Thrace had been settled. Even more important, no agreements had been reached upon three outstanding and vital issues, viz, the terms of the treaty with Turkey, the question of future relations with Soviet Russia and the fringe of states on her western border, and the enforcement of the treaties already signed or projected, especially the Treaty of Versailles with Germany, the task of executing which embraced a whole range of subjects such as reparations, disarmament, punishment of war-criminals, plebiscites, etc. These three major problems to say nothing of a host of subsidiary and secondary issues engaged the attention of the world continuously from 1919 to 1924 and necessitated a protracted series of difficult and delicate negotiations during which the appearance of Allied unity which had been so precariously maintained hitherto was even more seriously undermined On Jan 16, 1920, pursuant to the call of President Wilson the first session of the League of Nations Council convened in Paris, but though inextricably interwoven with the terms of the peace treaties and specially devised as a convenient and indispensable instrument of international coöperation and adjustment, the League was destined to play a relatively insignificant rôle in the controversies growing out of the territorial and economic settlement. (See LEAGUE OF NATIONS) Rather the work of carrying on diplomatic arrangements at the termination of the Peace Conference devolved upon the two agencies already mentioned: the Council of Ambassadors and the Council of Allied Premiers and Foreign Ministers. These councils held a rapid succession of formal and informal conferences during the ensuing years, now dealing with Russia, now with the execution of the German Treaty, then again with Turkey, Fiume, or Upper Silesia It was impossible to confine attention to any one problem until it was solved Others simultaneously pressed for adjustment and the divergence of national interests led inevitably to the use of the traditional and time-honored diplomatic methods of quid pro quo, compromise and compensation, interjected with accusations, threats, economic retaliation, ultimatums and armed clashes. The liquidation of two of these problems, i. e. the Turkish peace and the enforcement of the treaties, is discussed below. Under RUSSIA will be found an account of the handling of the Russian problem.

THE SETTLEMENT WITH TURKEY

The Turkish Secret Treaties. Of all the spoils of the Great War, the Ottoman Empire was among the richest. "Her undeveloped wealth in minerals and fuel, her potentialities as a producer of foodstuffs, cotton, and other agricultural products, her possibilities as a market —these were alluring as war time necessities and peace-time assets. Her strategic position was of inestimable importance to any nation which hoped to establish colonial power in the eastern Mediterranean Her future as a sphere of influence promised unusual opportunities for the investment of capital and the acquisition of exclusive economic rights" A long series of secret agreements were negotiated among the Allied Powers from 1915 to 1919 concerning the future political control and economic exploitation of Turkey. In March, 1915, Russia was assured of the annexation of the Straits and of Constantinople in return for assent to the assignment of the neutral zone of Persia to Great Britain and concessions to British interests in Mesopotamia and Egypt On Apr 26, 1915, by the Treaty of London, Italy was promised, among other things, a share in the Turkish Empire equal to that of Great Britain, France, and Russia, and including the port of Adalia and its hinterland. A more specific delimitation of interests took place in 1916. On April 26, one year after the Treaty of London, France and Russia signed the secret Sazonov-Paléologue Treaty dealing with their respective interests in northern Asiatic Turkey Russia was awarded a vast domain of 60,000 square miles between the Persian frontier and the Black Sea, with immense deposits of silver, salt and copper. The French were assigned a large slice of territory reaching south and west to the Mediterranean, the exact boundaries to be arranged with the British Two weeks later on May 9, the famous Sykes-Picot Treaty prospectively partitioned the southern part of Asiatic Turkey, allotting Syria, Cilicia and Southern Armenia to France in full sovereignty and establishing a French sphere of influence over the extensive and valuable provinces of Aleppo, Damascus, Deir, and Mosul Great Britain was given complete control over the Mediterranean ports of Acre and Haifa and the region of lower Mesopotamia stretching from Bagdad to the Persian Gulf. Italy was excluded from these pacts, but learning of them in roundabout ways manifested such grave discontent that on Apr. 17, 1917, a new secret agreement, that of St Jean de Maurienne, was signed. As subsequently modified in August, 1917, it provided that Italy was to get almost complete possession of the southern half of Anatolia, including the cities of Adalia, Konia, and Smyrna, together with an extensive sphere of influence in the region northeast of Smyrna inhabited chiefly by Greeks and Turks.

Curiously enough it was at this same time that the United States entered the war and that Allied statesmen were issuing fresh declarations

of unselfish war aims. To be sure the Russian Revolution and subsequent socialistic renunciation of all imperialistic ambitions combined with growing labor unrest to complicate the situation. In his address of Jan. 5, 1918, Mr. Lloyd George, speaking for the British government, disclaimed any intention of depriving Turkey of its capital, "or of the rich and renowned lands of Asia Minor and Thrace . . . predominantly Turkish in race," but did advocate a recognition of the separate national conditions of Arabia, Armenia, Mesopotamia, Syria, and Palestine. Three days later Mr. Wilson in his Fourteen Points speech stated that the Turkish portion of the Ottoman Empire "should be assured a secure sovereignty," but that submerged nationalities should be accorded "unmolested opportunity of autonomous development" and the Dardanelles should be permanently neutralized under international guarantees. This very definite pledge formed part of the pre-Armistice agreement which both Germany and the Principal Powers agreed to be morally binding for the Peace Settlement. Secret negotiations, however, continued to vitiate professed idealism. Lloyd George's speech in addition to reassuring British labor, mollifying Indian Moslems, and supporting Wilsonian internationalism served the ulterior but no less effective purpose of intimidating the French in secret dealings with regard to Turkey. In December, 1918, Clemenceau having visited London to secure confirmation of the Sykes-Picot arrangement of 1916, Lloyd George demanded the transfer of the valuable oil region of Mosul from the projected French sphere of influence to British control and also permission to determine the future of Palestine. Secret conversations continued unknown to "allied" Italians and "associated" Americans, and on February 15, a month after the Peace Conference began, the French were eventually obliged to accept the British proposal. On Mar. 20, 1919, just on the eve of the great French crisis described above, the finely spun network of secret treaties seriously entangled the Big Four in its meshes, when in secret session of that supreme conclave Lloyd George pressed for the dismemberment of Turkey. A heated controversy ensued between the British and the French. Wilson refused to acknowledge the validity of the secret engagements and proposed a settlement on the basis of his Twelfth Point. The matter was eventually compromised by the application of the mandate principle to transferred territories.

Other disputes arose continually. Early in February, 1919, the Italian claim to the Smyrna area having lapsed owing to the failure of Russia to sanction the St. Jean de Maurienne arrangement, the Greeks put in a claim to that region and also disputed Italian occupation of the Dodecanese. Italy sent expeditions to Smyrna and otherwise showed a disposition to anticipate decisions by the Conference. But when the Italians were absent from Paris in late April and early May, 1919, during the Fiume impasse, Venizelos pressed his claim and on May 6, unknown to the Italians, secured the secret authorization of the Big Three to occupy Smyrna. This move, being duly executed in the space of a fortnight, further embittered the Italians, and contributed to arousing Turkish nationalism with the dire consequences noted below. Lloyd George advanced numerous sordid schemes for solving the Fiume situation by granting Italy concessions in Asia Minor and Africa but they all fell through. The collapse of Russia caused a long and acrimonious discussion of the future disposition of Constantinople and the Straits. France, Great Britain and Italy being seriously distrustful of one another, the United States was offered a mandate as early as February, 1919. Wilson favored the idea, but refused to pledge the American people. The subsequent course of events in America led to the abandonment of the project, caused great fluctuations in Allied policy and indefinitely delayed the signing of the Turkish Treaty. In November and December, 1919, while the Supreme Council was yet functioning, the Turkish settlement was discussed by representatives of Italy, France, and Great Britain in special conferences, and on Feb. 16, 1920 at a conference held in London, it was finally announced that Constantinople would be left under Turkish suzerainty. The work of drafting the treaty was then pushed.

The San Remo Conference. On April 24, at the Conference of San Remo the main outlines of the settlement were completed. Mandates for Syria, Cilicia, and Lebanon were promised to France; for Adalia and Rhodes to Italy; for Palestine and Mesopotamia (including Mosul) to Great Britain; and for Armenia offered first to the League of Nations and later to the United States, both refusing to accept. Simultaneously the French and British delegates at San Remo signed a secret agreement providing for an equal division of interests and exploitation in Rumania for the transfer of the formerly German owned quarter interest in Mesopotamia oil, together with a quarter interest in Anglo-Persian oil piped to the Mediterranean through territory under French mandate in return for the provision by France of pipe lines and branch railways for the movement of their oil. The terms of this agreement gradually transpired despite denials by the signatories, and on November 20, Secretary of State Colby (successor of Mr. Lansing) lodged a vigorous protest refusing to recognize the establishment of these oil monopolies in Mesopotamia and elsewhere. This merely stimulated the British to negotiate a new secret convention with France on Dec. 23, 1920, confirming the previous agreement. On May 11, the preliminary draft was handed to the Turkish delegates at Sèvres, France. Its terms produced great excitement among the Nationalists in Turkey, who, under the leadership of Mustapha Kemal Pasha, evinced a determination to defy the Allies and work for the regeneration of their country's fallen prestige and power. (See TURKEY)

Boulogne and Spa Conferences. During May and June, the Nationalists, in control of Asiatic Turkey, drove the French to the coast of Cilicia and then threatened the Straits zone. So menacing did the situation become that on June 21, the Conference of Boulogne at which were represented France, Great Britain, Italy, Japan, Belgium, and Greece, authorized the Greeks to undertake military operations against the Nationalists. At the Conference of Spa Turkish requests for modifications in the peace conditions were rejected and an ultimatum was issued to coerce the Sultan's government, whose authority, due to the nationalist revolt, now scarcely extended beyond the confines of Constantinople, where it was both bolstered up and seriously limited by Allied occupation. On Aug. 10, 1920, the Treaty was signed at Sèvres, simul-

taneously with the signature of a secret tripartite agreement among Great Britain, France, and Italy and also of a special convention between Italy and Greece. Representatives of the United States and of Hedjaz were not present, and the Jugo-Slav delegates refused to sign.

Treaty of Sèvres. By the terms of this Sèvres Settlement of Aug. 10, 1920 the century-long devolution and dismemberment of the Ottoman Empire was virtually consummated. Territorially it was reduced from its 1914 area of 710,000 square miles to a small Turkish national state confined mainly to the interior of Asia Minor and embracing an area of less than 100,000 square miles. The Arab State of the Hedjaz was emancipated from Turkish sovereignty though subjected to British control. Armenia became a free Christian Republic, her boundary with Turkey to be arbitrated by President Wilson. Palestine, including Transjordania, under a League of Nations mandate held by Great Britain, was to afford a national homeland for the Jews. Syria, with Cilicia, was likewise detached from Turkey and made a mandate of France. Southern Anatolia, including the port of Adalia, was constituted as an Italian "sphere of influence," being a sorry remnant of the princely domain marked out for Italy by the St. Jean de Maurienne agreement Smyrna and its hinterland were transferred to Greece together with Thrace, Adrianople, the peninsula of Gallipoli, and the islands of Tenedos and Imbros. By special arrangement with Italy the Dodecanese Islands in the Ægean which had been occupied by Italy since the end of the Tripolitan War in 1912, were to be yielded to Greece with the exception of Costellorizo and Rhodes whose status was to be determined by plebiscites In the case of the latter the plebiscite was to be held only in case Great Britain, whose sovereignty over Cyprus was recognized by Turkey, ceded that Island to Greece. The French protectorates over Tunisia and Morocco were validated as were also those exercised by Great Britain over Egypt and the Sudan The coasts of the Dardanelles, the Sea of Marmora, and the Bosporus were erected into a neutralized "zone of the straits" controlled by a League of Nations commission consisting of British, French, Italian, Japanese, Rumanian, Greek, and Turkish members The Capitulations which the Sultan had abrogated in 1914 were revived and amplified; Turkey was made responsible for the costs of the Allied military occupation, and her own army was to be reduced to a maximum size of 50,000 men A Financial Commission was instituted to supervise taxation, customs, loans, and currency, to control the Turkish budget, and ratify or reject proposed economic concessions and all of this was to be done in the language of the tripartite agreement, "to help Turkey, to develop her resources, and to avoid the international rivalries which have obstructed these objects in the past."

Rejection of the Sèvres Treaty. Despite the acceptance of the Treaty of Sèvres by the Sultan's government at Constantinople, the divergent interests of the Great Powers created a serious lack of unity on the Near Eastern question which proved fatal when the Turkish National Assembly at Angora refused to ratify such an unjust convention. By October, 1920, through a series of successful military campaigns (see TURKEY) Mustapha Kemal Pasha obliterated the Armenian Republic, rendered the French position in Cilicia untenable, forced the British army of occupation back into the Ismid peninsula, and compelled the Italians to withdraw their troops to Adalia. Menaced by an Arab rebellion in Syria, unable to protect Cilicia against the Nationalists, unwilling to increase the size of their Syrian military establishment which already numbered 100,000 men, dissatisfied with the distribution of spoils in the Near East, fearful of the augmenting power and prestige of British imperialism, the French decided to scrap the Treaty of Sèvres and come to terms with the Angora government of Mustapha Kemal Pasha. Having broached the project to the non-committal Lloyd George at the London Conference of February–March, 1921, they negotiated directly with the Angora delegation and on March 9, there was signed at London a Franco-Turkish agreement terminating hostilities in Cilicia. The Nationalists recognized the special social and cultural interests of France in Turkey, confirmed French interests in the Bagdad Railway and promised favorable concessions to French capitalists in Cilicia and southern Armenia. France on her part was to evacuate Cilicia, readjust the Turco-Syrian boundary, and adopt a more benevolent attitude toward the Grand National Assembly (See CILICIA; BAGDAD RAILWAY.)

The Italian situation in Turkey was also very menacing for Italian troops had been driven out of Konia and maintained but an increasingly precarious position at Adalia. The Treaty of Sèvres was distinctly unpopular in Italy for it had registered a subversion of Italian prospects in Asia Minor to the advantage of the hated Greeks Accordingly on March 13, a Turco-Italian agreement was signed at London providing for the withdrawal of Italian troops from Ottoman soil and for economic collaboration between Italy and Turkey in the Adalian hinterland, together with the granting of certain valuable concessions to Italian capitalists. The Italian Government also pledged itself to support effectively Turkish demands for untrammeled sovereignty and the restitution of Thrace and Smyrna. Their valiant resistance having elicited a sympathetic response from Bolshevist Russia, on Mar 16, 1921, the Turkish nationalists achieved another diplomatic triumph when a treaty was signed at Moscow with the Russian Socialist Federated Soviet Republic. Russia refused to recognize the validity of the Treaty of Sèvres, disavowed all imperialist ambitions in Turkey, ceded outright the Caucasian territories of Kars and Ardahan, and declared the capitulatory régime null and void as being incompatible with the autonomous national development of Turkey

Further negotiations conducted between France and Turkey during the summer of 1921 for the purpose of confirming and elaborating their March agreement culminated in the signing of the Treaty of Angora, on October 20. The British were outraged at what they termed this breach of good faith and stimulated the Greeks to renewed efforts against Turkey. The Franco-British Entente Cordiale was strained to the breaking point, not alone by antithetical policies in the Near East, but by acute differences simultaneously manifested over relations with Russia, naval disarmament, and German reparations. During the protracted and sanguine war between Greece and the Turkish Nationalists in

Asia Minor during 1921–1922, the British supported the Greeks as convenient tools for the advancement of their own interests, but the French and Italians aided and abetted the Turks even to the extent of withdrawing their troops from Constantinople. The decisive victories of Mustapha Kemal Pasha during the late summer and autumn of 1922 swept the Greeks out of Smyrna. An armistice between the Turks and the Allies was signed at Mudania, Oct. 10, 1922, permitting the former to retain Smyrna, take over the administration of Constantinople, and reoccupy Eastern Thrace, pending the formulation of a new peace treaty, to replace the thoroughly discarded Treaty of Sèvres.

Lausanne Conference. A conference of the Turks and the European Powers was convened at Lausanne, Switzerland on Nov. 20, 1922 and was in session for eleven weeks, when it broke down, on Feb. 4, 1923, owing to the peremptory refusal of the Turkish delegation to accept a treaty drafted by the allied leaders. All hopes of destroying Turkish power by fostering Greek imperialism in Asia Minor had been dissipated, but Great Britain was determined to maintain control of Mesopotamia (particularly Mosul) and to secure continued neutralization of the Straits. The French supporting the Turks on these territorial questions, nevertheless aroused their suspicion and opposition by insisting on the maintenance of the Capitulations and the confirmation of all Allied concessions in Turkey. French prestige received a substantial setback with the granting (April 10) to American interests of the Chester concessions which authorized railroad construction and industrial developments throughout Eastern Asia Minor. The breach between France and Turkey grew wider with the lapse of time and when at Turkish suggestion and with Allied acquiescence the Conference of Lausanne was resumed on April 22, the French steadily lost ground, but, their power being almost wholly absorbed in the contemporaneous occupation of the Ruhr, they were unable to coerce the Turks into any measurable recognition of their claims. On May 15, it was disclosed that a syndicate of British interests had purchased a controlling interest in the Bagdad Railway.

The Lausanne Treaty. On July 24, 1923, the treaty was finally signed at Lausanne by representatives of Great Britain, France, Italy, Japan, Greece, Rumania and Turkey which constituted a drastic revision of the whole Near Eastern Settlement as registered in the Treaty of Sèvres. Jugo-Slavia alone refused to sign because of dissatisfaction with the Ottoman debt settlement Turkey definitely resigned all claims to Hedjaz, Palestine, Transjordania, Mesopotamia and Syria, but she retained all of Anatolia, Turkish Armenia, Cilicia, Adalia, Smyrna, Constantinople, Gallipoli, Adrianople and Eastern Thrace to the Maritza River. Along the new European frontier a neutral or demilitarized zone 60 kilometers wide was created, to prevent border conflicts. Likewise, but for a different purpose, the Gallipoli peninsula and the shores of the Straits were demilitarized and the Straits themselves were placed under an international commission supervised by the League of Nations. The "freedom of the Straits," for which the British foreign minister, Lord Curzon, had so valorously battled, was assured by a separate convention, bearing all the earmarks of compromise, by which merchant and war vessels, the latter in restricted number, were permitted liberty of passage in peace and war, except in case Turkey should be one of the belligerent powers. Disposition of the coveted oil fields of Mosul, in dispute between Britain and Turkey, was to be decided by diplomatic agreement, or, that failing, by reference to the League. Not only were the fettering restrictions which the Allies had attempted to place on Turkish finance, army, and navy, struck off, but reparation claims were canceled and the Allies recognized the abolition of the Capitulations, stipulating merely that Turkey should appoint for a transitional period of five years four legal councilors, from neutral states, to observe the working of the Turkish courts. The Nationalists, in short, won a remarkable diplomatic victory in their single-handed diplomatic combat with the powers of Europe. The erstwhile aggressive Greeks were thoroughly humiliated. Not only were they compelled to surrender Smyrna, Gallipoli, and Eastern Thrace to Turkey, but also to resign again to Italy the Greek-speaking Dodecanese islands in the Ægean. Some 600,000 Greek nationals were to be deported from Turkish territory in exchange for Turkish nationals.

As the United States had not participated in the Lausanne Conferences except through an "observer" (Mr. Grew), it was necessary to negotiate a separate treaty between Turkey and the United States, recording the consent of the latter to the abrogation of the Capitulations and other changes made by the treaty above described. Accordingly, on August 2 Turkish and American delegates at Lausanne signed a treaty of commerce and amity. Ratification by the Senate being delayed, this treaty was subjected to the buffets of political controversy in the United States, and its ultimate acceptance was far from certain in August, 1924.

ENFORCEMENT OF THE VERSAILLES TREATY

Some portions of the Treaty of Versailles such as the guarantees of its execution prescribed in Part 14 were merely recognitions of *faits accomplis*, and others were speedily put into operation. The League of Nations and the International Labor Organization authorized by Parts 1 and 13 respectively were early established—the first International Labor Conference being held in 1919 and the first session of the League of Nations being convened in 1920 Part 7 relating to penalties proved practically impossible of execution. On the ground that no existing International Court possessed legal jurisdiction, the Dutch government refused to comply with reiterated allied demands for the extradition and trial of the former German Emperor, and in March, 1920, the "solemn farce" was terminated by an understanding that William II would be indefinitely interned in Holland and prevented from participating in any further international mischief. A similar demand made upon Germany in February, 1920, for the extradition of some 882 war criminals, including civilians and military and naval officers of high rank, was finally abandoned in favor of a German proposal that the accused be tried by a German Federal Court at Leipzig. The Inter-allied Justice Commission promptly transmitted to Berlin the names of some 46 offenders against whom

the evidence was most conclusive, the Allies reserving the right to hold retrials should they consider the verdicts palpably unjust. The Germans were very dilatory about proceeding to try these men and though the matter was discussed at the Spa Conference (July 5–16, 1920) it was not until after the Allied ultimatum of Apr. 30, 1921, demanding action on this point among others, that trials began at Leipzig. A few convictions resulted but the whole proceeding was rather farcical.

Territorial cessions and boundary readjustments prescribed under Parts 2, 3, and 4 were effected as far as Germany was concerned without great difficulty except in the case of Upper Silesia. The economic sections of the treaty relating to Ports, Waterways and Railroads, etc., occasioned some difficulty, but the really great conflicts took place over German disarmament, involving the all-important issue of French security, and over reparations involving a whole complex of issues such as time and methods of payment, inter-allied allocation of the proceeds, inter-allied cancellation of debts, the restoration of northern France, Belgium etc., the economic rehabilitation of Europe, French security, extension of Allied occupation of German territories (e.g. seizure of the Ruhr), and the maintenance or disruption of Allied solidarity. (See REPARATIONS.)

The treaties of 1919–1920 as we have seen, provided for the unilateral application of the principle of disarmament with the avowed purpose of attaining that long sought objective—the destruction of German militarism. Throughout 1920, the Allies had to insist on reduction of the German army to the 100,000 limit imposed by the treaty. At the Spa conference (April 18–25) Premier Millerand, yielding to an Italian demand for trade negotiations with Russia, and to Lloyd George's Near Eastern importunities, secured as the price of his consent on these two points, a joint demand upon Germany for immediate disarmament, a refusal of a German request for a permanent army of 200,000 men, and a severe warning against future infractions of the Treaty. At the Spa Conference (July 5–16) German disarmament was the first question considered. After a heated discussion Germany in return for her promise to disband immediately certain auxiliary forces such as the *Sicherheitspolizei* and *Einwohnerwehr*, was finally granted (July 9) permission to postpone until Jan. 1, 1921 the reduction of her army to the prescribed limit, though it was stipulated that it should not exceed 150,000 effectives after Oct. 1, 1920. As a guarantee of her faithful execution of these requirements, the Allies reserved the right to invade and occupy the Ruhr Valley or other regions. After the Spa Conference the question of German disarmament continued to be the subject of numerous notes exchanged between the Entente Powers and the German government. The Germans, however, failed to live up to their promises, and disarmament along with reparations again came to the fore at the Paris Conference Jan. 24–29, 1921, at which time they were given until July 1 to comply with the Spa agreement. Persistent dilatoriness on this point together with non-payment of reparations and postponement of war-criminals trials, led to the issuance of an ultimatum (May 7, 1921) by the London Conference threatening invasion of the Ruhr should not the Germans without reservations comply with treaty requirements by May 12. On May 10 the Reichstag voted to submit. Thereafter better progress was made. The work of disarmament continued under the supervision of the inter-allied military control commission. French security constituted an important subject of discussion at the Cannes Conference January, 1922. As the best method of adequately protecting France against attack and of fostering peace in Europe, Lloyd George, voicing English opinion, advocated a tripartite agreement embracing England, France, and Germany. Premier Briand vehemently opposed this plan and demanded an Anglo-French military alliance. After considerable parley, a 10-year treaty was signed (but never ratified) by which both powers reaffirmed their common interest in those provisions of the Versailles Treaty relative to German fortifications and military activities along the Rhine; both powers undertook also to act in concert should Germany take any measures incompatible with the Treaty, and Great Britain specifically promised to place her naval, military, and aërial forces at the disposal of France in the event of direct and unprovoked aggression by Germany. Bitter opposition in the French Chamber of Deputies to Premier Briand's promises to moderate his attitude toward Germany led to his supersession by the nationalistic Poincaré. This change in the French government put an end temporarily to the chance of recementing Entente solidarity and foreshadowed the military occupation of the Ruhr. At the Genoa Conference (Apr. 10–May 15, 1922) Lloyd George proposed a 10-year European non-aggression compact, but the French refused to accept this plan unless every other European nation agreed to sign, unless Russia recognized all her existing boundaries during the 10-year period and unless France forfeited none of her rights for enforcement of the Versailles Treaty. During 1920–1921, France and Great Britain had drifted apart due to divergence of interests and policies, as regards German reparations, Poland and relations with Russia, and Turkey and the Near Eastern settlement. On January, 1923, the Franco-Belgian seizure of the Ruhr further undermined their relations, and by 1924 the *entente cordiale* of 1904 had been definitely transformed into suspicion and dislike, exacerbated not only by the above-mentioned differences on questions of policy but also by a keen rivalry in aëronautical expansion. France, meanwhile, in an endeavor to stabilize the treaties of which she had been the most active and powerful defender, had forged a network of alliances with other European states. In July, 1920, a defensive alliance was concluded with Belgium; in February, 1921, with Poland; and in 1924 with Czecho-Slovakia and Rumania. France therefore, became by the spring of 1924, the leading spirit in a system of European alliances maintaining standing armies aggregating nearly 2,000,000 men, and consecrated to the preservation of the newly made peace treaties by force if necessary. However, with the advent to power of the Labor ministry in Great Britain (January, 1924) and the replacement in France of the Nationalistic government of Poincaré by a Radical-Socialist ministry under Herriot (June, 1924), the prospects of a European settlement perceptibly brightened. The avowed intentions of

Premiers Macdonald and Herriot to pursue more pacific policies and to utilize the League of Nations as a universal guarantee of national security and an instrument of international cooperation, the favorable reception of the Dawes Report, the evidence of a new coöperative spirit in Germany regarding reparations and disarmament, the more widespread resumption of amicable relations with Russia, and the favorable outcome of the London Conference of July–August, 1924, all seemed to presage a new era in the liquidation of post-war problems of reconstruction and readjustment. Other phases of international post-war problems are discussed under the following heads: LEAGUE OF NATIONS; LABOR ORGANIZATION, INTERNATIONAL; MANDATES; REPARATIONS; WASHINGTON CONFERENCE; RACIAL MINORITIES TREATIES. For national points of view, see the history sections under the articles UNITED STATES; GREAT BRITAIN; FRANCE; GERMANY; RUSSIA; TURKEY; AUSTRIA; HUNGARY; etc Detailed treatment of the territorial and political disputes that arose out of the making of the Peace and its application will be found under the following: TIROL, GERMAN SOUTH; BURGENLAND; FIUME-ADRIATIC CONTROVERSY; KLAGENFURT; THRACE; BANAT; TRANSYLVANIA; BESSARABIA; BUKOVINA; SILESIA, UPPER; TESCHEN, ZIPS, AND ORAVA; DANZIG; ALLENSTEIN–MARIENWERDER; GALICIA; VILNA; MEMEL; LITTLE ENTENTE; SAAR BASIN; EUPEN, MALMÉDY, AND MORESNET; LIMBURG, SOUTHERN; LUXEMBURG; SCHLESWIG; RHINELAND; DODECANESE; SMYRNA; CILICIA; DARDANELLES AND BOSPORUS STRAITS; KURDISTAN; SHANTUNG. See the articles EUROPE and AFRICA for a general presentation of the territorial readjustments effected by the War in these two continents.

For preliminary discussions of peace, see WAR, DIPLOMACY OF THE.

PEACH BORER. See ENTOMOLOGY, ECONOMIC.

PEAR THRIPS. See ENTOMOLOGY, ECONOMIC.

PEARL, RAYMOND (1879–). An American biologist and statistician, born in Farmington, N. H., and educated at Dartmouth and the the University of Michigan He taught at the latter and the University of Pennsylvania until 1907, when he received the appointment of biologist and head of the department of the Maine Agricultural Experiment Station. He resigned this position in 1918 to become professor of biometry and vital statistics at the Johns Hopkins University School of Hygiene and Public Health. He was also made official statistician of the university and consultant in vital statistics and epidemiology to the United States Public Health Service. His published works comprise: *Modes of Research in Genetics* (1915); *The Nation's Food* (1920); *The Biology of Death* (1922); *Introduction to Medical Biometry and Statistics* (1923). In collaboration with Mitchell he wrote the *Reference Handbook of Food Statistics.*

PEARSE, ARTHUR SPERRY (1877–). An American zoölogist, born at Crete, Neb., and educated at the University of Nebraska and Harvard. He was Austin teaching fellow at Harvard (1907–08); instructor in zoölogy (1909–10) and assistant professor (1910–11) at the University of Michigan; assistant professor of zoölogy at the University of the Philippines for three months in 1911; and associate professor (1912–19) and professor of zoölogy (1919–) at the University of Wisconsin. Professor Pearse published articles on animal behavior, fishes, and crustacea, as well as *General Zoölogy* (1917).

PEGRAM, GEORGE BRAXTON (1876–). An American physicist, born at Trinity, N. C., and educated at Trinity College, Durham, N. C., at Columbia University, and at Berlin and Cambridge. In 1900 he became assistant in physics at Columbia, where in 1916 he became full professor and in 1917 dean of the faculty of applied science. He was a magnetic observer with the United States Coast and Geodetic Survey (1902–06). Dr. Pegram made original studies on the electromagnetic theory and on radioactivity.

PEIXOTTO, ERNEST CLIFFORD (1869–). An American artist, born in San Francisco. He studied in Paris as a pupil of Benjamin Constant and Jules Lefebvre at the Académie Julien. He spent much of his time in Europe writing and illustrating for American periodicals and during the War directed the American Expeditionary Forces art training centre at Bellevue, France. He was elected Associate of the National Academy in 1919 and Chevalier of the Legion of Honor in 1921. Besides having exhibited many pictures at the Paris Salon and in leading American galleries, he produced many books on travel in Europe and America. He executed mural friezes and was director of mural painting at the Beaux-Arts Institute of Design, New York, after 1919. His later books include: *By Italian Seas; Through the French Provinces; Romantic California; Pacific Shores from Panama; Our Hispanic Southwest; A Revolutionary Pilgrimage,* and *The American Front.*

PELLAGRA. The nature of this strange malady was not cleared up in the interval between 1914 and 1924; if anything, less was known about it in 1924 than ever. In the south of Europe, pellagra was known continuously for centuries and seemed to be nothing more than a form of poisoning by spoiled maize. Study in the United States showed many facets of the disease, and now it is known that many who have been committed to insane asylums in the northern States, Canada, Great Britain, and other cool countries in which pellagra has never been recognized, have in reality been sufferers from this same affection. Cases were reported in England, where maize is not eaten, and once attention had been focused on the possibility of further cases, numbers were recognized among the insane population, and the supposition that this is nothing new asserted itself. The theory of spoiled maize which was reasserted in connection with new cases of the disease in Rumania gave way to another, after the discovery of vitamine, to the effect that pellagra is not a form of food intoxication but is due to the absence of some vitamine-like principle in the food. This view was soon shown to be fallacious, but it was found that the disease could at times be prevented by a well-balanced, nutritious diet, while pellagrins also improved and even appeared to recover on such a diet. The theory of a deficient diet was partly exploded by the discovery that in California and Louisiana prosperous and well-nourished people were developing the disease. Despite all negative evidence, it cannot be denied that in one locality spoiled maize and in another a merely defective diet has precipitated the dis-

ease, and that when the cause was withdrawn the disease receded. In 1924 it seemed that several quite dissimilar factors could either predispose to or excite the disease and that the essential causal factor was as yet unknown.

PELLE, M. C. J. (1869–1924). A French soldier and diplomat, born in 1869. During the War he was chief of staff to Marshal Joffre and in 1920 was appointed High Commissioner to Constantinople. He endeavored to bring about a cessation of hostilities between the Turks and the Greeks and to promote harmony between the Turks and the Allies. He was one of the signers of the Treaty of Lausanne Later he was sent to Czecho-Slovakia as chief of the French mission, and on Mar. 15, 1924, the French government conferred on him the Grand Cross of the Legion of Honor in appreciation of his services.

PELLIOT, PAUL (1878–). A French archæologist and Orientalist, born in Paris. In 1899 he was made a member of the Archæological Mission to French Indo-China, subsequently the French School of the Far East. In 1905 he was named by the Minister of Education to head an archæological expedition to Central Asia and China, to investigate traces of pre-Islamic Buddhism in China. At Tunchuk, in the Chinese Turkestan, Pelliot discovered the ruins of a Buddhist temple built in the Græco-Buddhist style, and from there he was directed to a monastery at Tuen Huang, where he made an amazing find of some 15,000 manuscripts and silk paintings. He brought back most of the manuscripts as well as other objects of historical value to Paris. The collection of Chinese manuscripts which he organized at the Bibliothèque Nationale was larger than any to be found in China proper. The manuscripts, which all date before the eleventh century, are in Chinese, Tibetan, and Sanskrit The French government rewarded Pelliot for his expedition by creating for him at the Collège de France a chair on the languages, history, and archæology of Central Asia. In 1921 he was elected to the Academy of Inscriptions. A catalogue and description of the findings of his expedition was published under the title *La Mission Pelliot en Asie Centrale,* 5 vols. (1914–21).

PENANG. See STRAITS SETTLEMENTS.

PENNELL, JOSEPH (1860–1926). An American etcher, illustrator, and author (see VOL. XVIII). His later publications include *Pictures of War Work in America* (1918) and *Etchers and Etching* (1919). With his wife he edited *The Whistler Journal* (1921). He was chairman of the jury of the International Exhibition at Leipzig in 1914 and also at the Panama-Pacific Exposition in 1915, where he was awarded a commemorative medal. He won the Grand Prix in Florence in 1915 and was elected to the American Academy of Arts and Letters in 1922. In recent years he has conducted a wide and influential propaganda for better education in the graphic arts in the United States.

PENNINGTON, MARY ENGLE (1872–). An American chemist, born at Nashville, Tenn., and educated at the University of Pennsylvania, where she was a fellow in botany. During 1897–98 she was a fellow in physiological chemistry at Yale. In 1898 she became director of the chemical laboratory of the Women's Medical College of Pennsylvania, meanwhile serving as chief of the Philadelphia Chemical Laboratory. These positions she resigned in order to accept the office of chief of the food research laboratory of the Bureau of Chemistry in Washington (1908), which she held until 1919, when she became manager of the research and development division of the American Balsa Company of New York. Her original investigations pertained to the chemical, bacteriological, and histological study of flesh foods, as well as of milk, on which she published her results in the publications of the American Chemical Society, the Society of Biological Chemists, and other scientific organizations.

PENNSYLVANIA. Pennsylvania is the thirty-second State in size (45,126 square miles) and the second in population; capital, Harrisburg. The population increased from 7,665,111 in 1910 to 8,720,017 in 1920, a gain of 13.8 per cent. The white population increased from 7,467,713 to 8,432,726; negro, from 193,919 to 284,568; native white, from 6,028,994 to 7,044,876. The foreign-born white population decreased from 1,438,719 to 1,387,850. Both urban and rural populations increased in the decade, the former from 4,630,669 to 5,607,815; the latter from 3,034,442 to 3,112,202 The growth of the principal cities was as follows: Philadelphia, from 1,549,008 in 1910 to 1,823,779 in 1920; Pittsburgh, 533,905 to 588,343; Scranton, 129,867 to 137,783; Reading, 96,071 to 107,784; Erie, 66,525 to 93,372. See articles on these cities.

Agriculture. Pennsylvania is one of the greatest of the eastern agricultural States, but in common with nearly all of them it showed a general decline in agriculture during the decade 1910–20. While the population of the State increased 13.8 per cent in that decade, the rural population decreased from 45.3 per cent in 1900 and 39.6 per cent in 1910, to 35.7 per cent in 1920 The total acreage in farms in 1910, 18,586,832, fell off to 17,657,513 in 1920, or 5 per cent. The number of farms decreased from 219,295 to 202,250 or 7.8 per cent, the improved land in farms, from 12,673,519 acres to 11,847,719, or 6.5 per cent. The percentage of total land area used for agricultural purposes decreased from 64.8 in 1910 to 61.5 in 1920; the percentage of land improved, from 68.2 to 67.1. The total value of all farm property showed an apparent increase, from $1,253,274,862 to $1,729,353,034, or 38 per cent, the average value per farm, from $5715, to $8551. In interpreting these values, however, and, indeed, all comparative values in the decade 1914–24, the inflation of the currency in the latter part of the period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 202,250 farms in 1920, 153,498 were operated by owners, 4490 by managers, and 44,262 by tenants. The comparative figures for 1910 were 164,229, 3961, and 51,105. White farmers in 1920 numbered 201,799, of whom 187,277 were native and 14,522 foreign-born. The negro farmers numbered 451. Farms free from mortgage in 1920 numbered 93,804, compared with 112,156 in 1910. Those under mortgage numbered 48,498, compared with 50,699 in 1910. The total number of dairy cows in 1920 was 1,049,763; 933,640 in 1910. "Beef cows" numbered 57,440, compared with 99,220 in 1910; and sheep declined in number from 637,541 to 508,711. There were 977,637 hogs in 1910, and

1,190,951 in 1920 The estimated production of the principal farm crops in 1923 was as follows: corn, 62,062,000 bushels; spring wheat, 221,000; winter wheat, 24,168,000; oats, 31,-996,000; rye, 3,655,000; barley, 282,000; potatoes, 20,539,000; sweet potatoes, 235,000; tobacco, 57,408,000 pounds; buckwheat, 4,434,000 bushels; and hay, 3,019,000 tons. Comparative figures for 1913 are: corn, 57,057,000 bushels; wheat, 21,862,000; oats, 35,774,000; rye, 4,900,-000; barley, 182,000; potatoes, 23,320,000; hay, 4,146,000 tons; and tobacco, 46,680,000 pounds. The apple crop in 1909 amounted to 11,048,430 bushels; in 1919, to 5,512,795. The production figures for peaches in those years were 1,023,570 and 1,099,737 bushels, respectively.

Mining. Pennsylvania, in point of value of products, is most important of the mineral-producing States. In the order of their importance, these products are coal, cement, natural gas, and clay products. Petroleum, of which the State was the original and for many years the chief producer, lost importance through the gradual exhaustion of the wells and the discovery of large areas of petroleum land in other States. Pennsylvania is the only State which produces both anthracite and bituminous coal. All the anthracite coal produced is obtained from the Pennsylvania fields. The progress of the coal mining industry during the decade 1914-24 is indicated by the following production figures: 1914, bituminous, 147,983,294 net tons valued at $159,006,296; anthracite, 90,821,-507 net tons valued at $188,181,399. 1915, bituminous, 157,955,137, $167,419,705; anthracite, 88,995,061, $184,653,498. 1916, bituminous, 170,-295,424, $221,685,175; anthracite, 87,578,493, $202,009,561. 1917, bituminous, 172,448,142, $421,268,808; anthracite, 99,611,811, $283,650,-723. 1918, bituminous, 178,550,741, $463,159,-736; anthracite, 98,826,084, $336,480,347. 1920, bituminous, 170,607,847, $642,630,000; anthracite, 89,598,249, $434,252,198. 1921, bituminous, 116,013,942, $322,538,300; anthracite, 90,473,-451, $452,304,903. In 1922 the bituminous production was 113,148,308 net tons; the anthracite, 54,683,022. The greatly increased value of coal in the later years of the decade was due partly to conditions arising from the coal miners' strikes and partly to the inflation of the currency. In shipments of Portland cement Pennsylvania ranks first among the States, with 25,985,106 barrels, valued at $20,944,787, in 1914; 28,748,546 barrels, $27,915,298, in 1916; 22,238,689 barrels, $33,600,956, in 1918; 27,662,116 barrels, $52,632,082, in 1920; and in 1922, 34,023,695 barrels. The production of petroleum during this period averaged about 8,000,000 barrels per year: In 1914 it was 8,-170,335 barrels; 1916, 7,592,394; 1918, 7,407,-812; 1920, 7,438,000; 1922, 7,425,000. In addition to the minerals noted above, the State produces large quantities of clay products, natural gas and natural gas gasoline, sand and gravel, and stone. The total value of the mineral products in 1921 was $944,688,650, compared with $1,314,332,585 in 1920; $918,048,917 in 1919; $979,245,098 in 1918, and $452,824,034 in 1914.

Manufactures. Pennsylvania, ranking second among the States in industrial importance, was surpassed only by New York. There were, in 1920, 77 cities having more than 10,000 inhabitants, which formed 50.8 per cent of the total population of the State and which reported, in 1919, 63.7 per cent of the State's manufactured products. There were in the State, in 1909, 27,563 manufacturing establishments; in 1914, 27,521; and in 1919, 27,973. Persons engaged in manufacture numbered 1,002,171, 1,060,562, and 1,323,662; and the capital invested amounted to $2,749,005,975, $3,149,411,089, and $6,177,-729,968, in those years. The value of products in 1909 was $2,620,742,034; in 1914, $2,832,-349,437; and in 1919, $7,315,702,867. The large increase in the value of products in 1914–19. was, however, due largely to changes in industrial conditions brought about by the War and cannot properly be used to measure the growth of manufactures during the period; but the increase in number of wage earners clearly indicates a decided growth in the manufacturing activities of the State. Steel works and rolling mills, chief in point of value of product, had an output valued, in 1909, at $500,344,000; 1914, $448,106,000; 1919, $1,296,412,000 Foundry and machine shop products rank second in this respect, amounting in 1909 to $210,746,-000; 1914, $233,616,000; and 1919, $624,415,-000. Iron and steel blast furnace production is third in value of output: in 1909, $168,578,-000; in 1914, $135,806,000; in 1919, $311,080,-000. Ship and boat building, in fourth place, in 1909 amounted to $6,178,000; 1914, $9,540,-000; and in 1919, $237,325,000. The extraordinary increase in the value of the shipbuilding industry from 1914 to 1919 was due, of course, to the unusual demand for ships during the War, and cannot be taken as an index of the normal increase of the industry. The most important manufacturing cities of the State are Philadelphia, Pittsburgh, and Reading. There were (1909), in Philadelphia, 8375 manufacturing establishments, with a product valued at $743,720,000; in 1914, 8545, with $784,500,000; and in 1919, 9064, with $1,996,481. In Pittsburgh, in 1909, there were 1658 with $243,392,-000; in 1914, 1741 with $246,694,000; and in 1919, 1875 with $614,727,000. Similar figures for Reading are: in 1909, 482, with $51,135,000; in 1914, 486 with $53,232,000; and in 1919, 527 with $141,561,000. Other manufacturing cities are Allentown, Altoona, Bethlehem, Erie, Scranton, and Wilkes-Barre.

Education. While Pennsylvania has always been aggressive in the education of its citizens, in many respects the laws under which its system was administered both previous to and during the decade 1913–23 were unsatisfactory. To remedy this condition the Legislature of 1921 passed a number of laws. These provided for the raising of the standard qualifications of teachers; established a higher schedule of salaries; added to the support of the normal schools, increasing their facilities and improving their work; increased the length of the school term, especially in fourth-class districts; reënforced compulsory school attendance; established State aid to local communities for the maintenance of new and higher standards; established a budget system in every school district; encouraged the consolidation of rural schools; and centralized and unified the State school administration by abolishing the State Board of Education and the college and university council and creating in their place the State Council of Education. These new measures were proving most beneficial in their results. One of the best evidences of the results was the remarkable response of the teachers to

the new demands for improved qualifications; for nine weeks during the summer vacation in 1922, more than 25,000 school teachers attended summer school, taxing the colleges and normal schools of the State to their utmost capacity. The total number of pupils in the State in 1913–14 was 1,401,325. This had increased in 1920–21 to 1,709,077 The enrollment in kindergarten and elementary schools in the latter year was 1,514,825, in the high schools, 194,852. The total expenditures for education increased from $52,544,036 in 1913–14 to $129,344,699 in 1921–22. The percentage of illiteracy in the State decreased from 7.3 in 1910 to 6 in 1920; among the native white population, from 1.8 to 1; among the foreign-born white, from 20.8 to 20.1; and among the negro population from 11 to 7 3

Finance. For finance, see article on STATE FINANCES.

Political and Other Events. Pennsylvania remained strongly Republican as heretofore in the decade 1914–24 In 1914 elections were held for United States Senator and for Governor and other state offices. Martin G. Brumbaugh, Republican, was elected governor, against Vance G. McCormick, Democrat. The Republican candidate for reëlection to the Senate was Boies Penrose. He was opposed by A. Mitchell Palmer, Democrat, and Gifford Pinchot, Washington party Senator Penrose received 519,801 votes; Pinchot, 269,265; and Palmer, 266,415. In 1916 Philander C. Knox, Republican, was elected to the United States Senate. In the presidential election that year Charles E. Hughes received 703,823 votes; Woodrow Wilson, 521,784. The 1917 municipal primary elections in Philadelphia and Pittsburgh were marked by more than ordinary factional bitterness which had not been entirely eliminated up to 1924. There was serious trouble in Philadelphia, where a number of officials were accused of having brought gunmen from New York into one ward to influence the election. In 1918 William Cameron Sproul, Republican, was elected governor, together with the entire State ticket of that party. At the same election the people approved a constitutional amendment providing a $50,000,000 bond issue for highways In 1920 Boies Penrose was reëlected to the Senate, with 1,067,989 votes. John A. Farrell, Democrat, received 484,362 votes, while 132,610 were cast for Leah Cobb Marion, Prohibitionist, the first woman in a Pennsylvania State-wide political contest. In the presidential voting Warren G. Harding received 1,218,216 votes; James M. Cox, 503,843 President Harding appointed two Pennsylvania Republicans to cabinet positions. They were Andrew W. Mellon, Secretary of the Treasury, and James J. Davis, Secretary of Labor. In 1921 the people rejected a proposal to hold a constitutional convention. Senator Knox died suddenly in October, 1921, and William E. Crow of Uniontown was named by Governor Sproul to succeed him. Senator Penrose, the recognized leader of the State Republican organization, died on New Year's Eve of the same year. George Wharton Pepper of Philadelphia was appointed to his place In August, 1922 Senator Crow died. He was succeeded by David Aiken Reed of Pittsburgh. The Republican primary election in May, 1922, was marked by a bitter contest for the gubernatorial nomination between Gifford Pinchot, supported by the Progressive element, and Attorney General George E. Alter, whose chief support came from the Philadelphia and Pittsburgh organizations. Pinchot's majority was 9259 votes, and he was elected Governor in November over John A. McSparran, Democrat, head of the State Grange. Senators Pepper and Reed were elected at the same time. In 1923 Governor Pinchot was largely instrumental in averting the threatened anthracite coal miners' strike. In the spring election of 1924 the people approved another constitutional amendment providing an additional $50,000,000 bond issue for roads The most interesting event of that election was the defeat of Governor Pinchot for delegate-at-large to the Republican national convention by an eleventh-hour attack on the part of disgruntled political leaders and liquor interests led by Representative William S Vare of Philadelphia. In June, 1924, W. Harry Baker was reëlected chairman of the Republican State Committee without opposition, while Joseph F. Guffey, after a bitter fight, seized control of the Democratic organization in spite of opposition from the faction headed by Judge Eugene C. Bonniwell and Judge Samuel E Shull and from the wing led by Vance McCormick and Bruce F. Sterling. John Bigelow, a Guffey adherent, was elected Democratic chairman. Before the general election of 1924 the political complexion of Pennsylvania's congressional delegation was: Senate—Republican, 2; House—Republican, 30; Democratic, 6.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. The Legislature of 1915 approved a resolution for a State constitutional amendment providing for woman suffrage; this was voted down by the people by a 55,686 majority. In 1917 a direct inheritance tax law was passed. As a war measure a State council of defense was created and $5,000,000 provided for it. The 1919 Legislature ratified the woman suffrage amendment to the national Constitution on January 24 and the prohibition amendment on February 25. In 1921 bitter opposition developed to a legislative programme proposed by Governor Sproul On April 25 his supporters held a rump session, ousted the Speaker, elected another in his place, and passed all administration measures. These included taxes on anthracite coal and gasoline, a measure repealing non-partisan election laws in Pittsburgh and Scranton, and a bill creating a State department of public welfare. The 1923 Legislature, with eight women members, repealed the high license law for saloons and adopted one more in harmony with the Volstead Act. It passed a modified old-age pension bill, approved a measure providing for a constitutional convention in 1926, subject to the approval of the voters, and favored a constitutional amendment providing a $35,000,000 bond issue for a soldiers' bonus, which had been approved by the 1921 Legislature also. The gasoline tax was increased and a small tax placed on profits, but proposals to tax bituminous coal and the capital stock of manufacturing corporations and to repeal the anthracite coal tax were defeated. An extensive reorganization of the State government, proposed by Governor Pinchot, was adopted. A series of 12 election reform bills was defeated In 1924 the State Supreme Court ruled that owing to technical defects the proposed soldiers' bonus amendment could not be

submitted to the people. In July, 1924, the Dauphin County court held the old-age pension bill unconstitutional. Constant legislative efforts to improve the educational facilities of the State resulted in an elaborate educational system for which the 1923 Legislature appropriated $46,401,881 to be administered by the Department of Public Instruction.

PENNSYLVANIA, UNIVERSITY OF Located in Philadelphia, Pa.; founded in 1740 and developed by Benjamin Franklin. During the 10-year period from 1914 to 1924 the university developed in every line. The student enrollment increased from 2245 in 1914 to 8302 in the regular courses, and 7438 in the extension courses in 1923–24. The faculty increased from 241 to 1100 members including administrative officers and research workers The library increased from 75,000 to 548,387 volumes The development of the university during this period was shown by the establishment of the following separate schools, each with its own dean or director: (1) the School of Education, established in 1914; (2) the Graduate School of Medicine, said to be the only one of its kind in existence, formed in 1919 by a merger with the university of the Medico-Chirurgical College and Hospital and the Philadelphia Polyclinic Hospital and College for Graduates in Medicine, (3) the School of Hygiene and Public Health, developed in 1920 from the former Laboratory of Hygiene; (4) the School of Fine Arts, formed in 1920 by a merger of the former separate departments of music and architecture; (5) the Moore School of Electrical Engineering, established in 1923 by a merger of the courses at the university in electrical engineering with the School of Electrical Engineering provided for in the will of the late Alfred Fitler Moore. The new school had an endowment of approximately $1,600,000. Other developments were the establishment of a course in military science and tactics in 1917 and the construction in 1922, at a cost of $825,000, of the new stadium on Franklin Field, which had a seating capacity of 55,000.

A number of important gifts were received by the university during this period. Among them was a gift of $400,000 from the estate of Dr J. William White to establish the White professorship of surgical research; a gift of $500,000 from Helen T Massey to increase the salaries of faculty members in the College; a gift of $549,736 from the estate of William B. Irvine to construct an auditorium; and a gift of $113,518 from the estate of Abraham S. Wolf through the generosity of Miriam H. Wolf for a ward in the University Hospital. New buildings erected included the J. William White Surgical Pavilion; a maternity building for the University Hospital, and a new wing for the University Museum.

The dismissal of Prof. Scott Nearing in 1915, on the ground that he made speeches of a radical nature which injured his usefulness as a member of the faculty, attracted wide attention, and much was published in defense and criticism of the action. Fifteen hundred of the students signed a petition asking the Board of Trustees to recall Dr. Nearing, but they declined to reconsider their decision.

During the War the university conducted its regular courses in military science and tactics and maintained training units for the United States Army and Navy. It also organized a base hospital in France, seven Red Cross units, and three ambulance units.

Edgar Fahs Smith, Ph.D., Chem.D., Sc.D., Litt.D., L.H.D., LL.D., resigned as provost in 1920 and was succeeded by Josiah H. Penniman, Ph.D., LL.D, as acting provost. Dr. Penniman was elected provost in January, 1923, and president of the university in October, 1923.

PENNSYLVANIA STATE COLLEGE. A nonsectarian, coeducational institution at State College, Centre County, Pa., founded in 1859. The student enrollment of the college increased from 2245 in 1914 to 3300 undergraduates and professional students and 150 graduate students in the year 1923–24, with more than 2000 in the summer session of 1923, the faculty increased from 241 to 631 members, with 320 resident members, 31 research workers, and 280 extension workers; the library increased from 75,000 to 81,000 volumes A group of four large engineering buildings was completed in the decade in addition to a mechanical engineering building finished in 1920. A new residence hall for men and a new beef cattle barn were completed in 1923, and an 18-hole golf course was laid out. Farm land holdings were increased to 2000 acres and the campus proper to 200 acres. A Graduate School was authorized in 1922, and a School of Education was created in 1923. John Martin Thomas, D.D., LL.D., formerly president of Middlebury College, Vt., in 1921 succeeded Edwin Erle Sparks, LL.D., as president.

PENNSYLVANIA UNIVERSITY MUSEUM. See EXPLORATION.

PENOLOGY. The outstanding event in penology within the decade 1914–24 was the extension of the plan of inmate self-government to prisons for male adults. This plan was not of sentimental origin, as some critics have charged, but was based on the therapeutic principle that to reform law-breakers it is wise to hold them during confinement in a social *milieu* similar to that into which they will later be discharged, and further to give them an opportunity to use, under such limits as restraint imposes, those faculties or qualities of self-reliance, initiative, judgment, and responsibility which normal life requires. As such, it is opposed to the traditional system of autocratic discipline or rule in prisons, by which substantially every movement of the prisoner's day is fixed for him. Self-government had been a feature of the George Junior Republic, founded by William R George at Freeville, N. Y., in 1895, and in 1912 Calvin Derrick had adapted the plan to the State reformatory at Ione, Cal. The first extension of the idea to adult male prisoners was made at the New York State prison at Auburn, N. Y., in 1914 under the unofficial inspiration and guidance of Thomas Mott Osborne, who later in the same year became warden of Sing Sing, another prison for confirmed male offenders in the same State, and incorporated the plan there. In both instances the self-governing body was named the Mutual Welfare League. Each incoming prisoner became a participant in the self-governing activities and could be expelled by the members. The activities consisted of advising and to a large extent conducting the routine affairs of the prison; this was done both through elected officials from the mass of prisoners and through committees. The prisoners handled much of

the discipline of the prison also and punished their own members through inmate courts. Later, Osborne put the plan into effect at the United States Naval Prison at Portsmouth, N. H., where he was commandant for two years. At none of these three places did it remain in effect in 1924, except in a somewhat emasculated form at Sing Sing. The State reformatories at Rahway, N. J., and Cheshire, Conn., adopted the plan for a time but abandoned it It is now in effect at the Westchester County Penitentiary at White Plains, N. Y., and at the New Jersey State Reformatory for Women at Clinton, N. J. A beginning toward its adoption was made at the Detroit House of Correction. At a number of other penal institutions there were modifications in the traditional autocratic régime in response to the educational effect of the self-government idea

Unquestionably the decade saw a rapidly growing interest in the law-breaker and a more scientific approach to the difficulties of his treatment. This was evidenced by a number of careful studies of State and municipal penal systems in the United States In 1916 the New Jersey Prison Inquiry Commission made a searching study of all correctional and penal institutions in that State. A similar study was made in Pennsylvania in 1917–18 The National Committee on Prisons and Prison Labor made a study of the District of Columbia's penal institutions, and the Prison Survey Committee of New York State published the results of a survey of the penal system of that State in 1920. A very thorough study of the penal system of Texas was begun by the Texas Committee on Prisons and Prison Labor in 1923 In all these studies the aim was to supply information in regard to the disciplinary, educational, vocational, dietetic, medical, and other aspects of penal and correctional systems on which improvements calculated to make offenders better members of society could be based. The Cleveland Foundation, after an exhaustive study of criminal justice in Cleveland, published its report in 1922; this covered police administration, prosecution of accused persons, criminal courts, correctional and penal treatment, medical science and criminal justice, legal education, and newspapers and criminal justice. The range of this and other studies showed a growing realization that whatever society does to an offender, from his first apprehension to his ultimate release from prison, is part of a continuous process, and that from the point of view of its effect on him, each step in the process must be taken into account

In general, actual treatment in penal and correctional institutions may be said to have responded slightly to the doctrine that, since all prisoners except those who are killed or actually confined for life, are ultimately restored to society, they should be so treated as to make them better members of society This has led, with other things, to an agitation for more vital education and a more educative vocational life Farm prisons on wide acreage have been established in several States, and more careful assignment of prisoners to work has been made in some prisons. The principles of the indeterminate sentence, probation, suspended sentence (especially for first offenders), separate or juvenile courts for children, and parole or after-care attention for released prisoners were accepted to a somewhat greater extent by judges, lawmakers, and prison officials; probation was slightly extended to adult offenders. On the other hand, the United States Supreme Court held that Federal courts did not have power to suspend sentence or to use probation; bills granting such power were presented at each subsequent session of Congress. The county jail, in which both sentenced prisoners and persons merely awaiting trial were commonly kept, was increasingly seen in a bad light, although little actual attempt was made to improve it or to alter its function. Under the influence of so-called "crime waves" in a number of cities, some Legislatures increased the severity of penalties; four States which had abolished capital punishment restored it. The War, too, had a deterrent influence on reform, although both in the United States and Great Britain it had in one way a good effect; prisoners sentenced under espionage and other war-time acts have, on their release, written vividly about prison evils and so awakened public consciousness toward them.

It is already evident that penology will in time be profoundly affected by developments during the decade in criminology These have to do with closer study of the heredity, environment, and mental peculiarities of individual offenders The purpose of such studies is twofold: first, to discover general causes of crime, secondly, to discover those causes operating in an individual which may make successful treatment more assured In such studies every branch of psychology is called into play. William Healy made perhaps the first notable contribution to the study of mental peculiarities in offenders when he published *The Individual Delinquent* (Boston, 1915), based on a study of juvenile law-breakers in Chicago Some earlier research had been done in Germany, and since then numerous detailed investigations of other groups have been undertaken The Bureau of Social Hygiene, originally organized at the New York State Reformatory for Women at Bedford Hills, N. Y., conducted several such studies A psychiatric clinic for the study of offenders was formed at Sing Sing under Osborne, and psychiatric work was done at other prisons Several States created the position of State criminologist In general, the theory underlying this development is that crime, like all conduct, is the reaction of a particular personality to a particular environment, and that successful therapy or reformative treatment requires the discovery of those factors in the personality or the environment, or both, which cause crime, and their removal or modification. Some courts made much use of diagnostic mental reports on offenders before sentencing them, and some prisons used such studies of inmates in treatment in prison. In general, however, actual application in institutions of psychiatric information and methodology was slight

Although the United States is the only great civilized country which does not gather its criminal statistics, a special committee of the American Bar Association made interesting comparisons in 1923. From 1910 to 1922, according to this committee, the general population in this country increased 14.9 per cent; the criminal population 16.6 per cent. Crime decreased noticeably during the War but afterward rose. The country continued to have far more crimes than western Europe. In all England and Wales in 1921 there were 63 murders,

and in 1922 there were 17 murders in London; the number of murders in France in 1919 was 585. In New York City alone there were 260 murders in 1921, and in Chicago 137; the estimated number of homicides in the whole United States in 1922 was 14,640. Of robberies, 95 were committed through England and Wales in 1921, and 121 in France. In 1922 New York City alone reported 1445 robberies; Chicago, 2417. The total number of persons in penal and correctional institutions in the country on July 1, 1922, according to the United States Census, was 163,889.

PENSIONS. See LABOR LEGISLATION; MOTHERS' PENSIONS; OLD AGE PENSIONS, SOCIAL INSURANCE

PEPPER, GEORGE WHARTON (1867–). An American legislator (see VOL. XVIII). In 1914 he participated in the movement for national preparedness. During the War he was chairman of the Pennsylvania Council of National Defense and in 1920–21 a member of the Commission on Constitutional Revision in Pennsylvania In 1915 he was Lyman Beecher lecturer at Yale Following the death of Senator Penrose he was appointed by the Governor of Pennsylvania to succeed him and held office until after the popular election in November, 1922, when he was elected by a plurality of more than 350,000 votes In June, 1922, he was chosen a member of the Republican National Committee to succeed Senator Penrose. On taking his seat in the Senate he assumed a prominent place in the debates and work of that body.

PERAK. See MALAY STATES, FEDERATED.

PERCEPTION. The problem of perception has been the stumblingblock of scientific psychology ever since its inception. The reason for this is quite simple. Positive science has always been committed to the atomistic analysis and to the mechanistic explanation in general. In the physical sciences the perception of objects, i e the perception of unities over and above the conglomeration of atomic elements, was always taken for granted; but psychology, so far from avoiding this problem, attempted to deal with it by the orthodox method of atomic divisions. Metaphysically, the task was complicated by the relation of body and mind, or matter and consciousness At the very outset of modern science the paradoxes of Descartes' mechanistic dualism had become apparent to every reflective thinker, and not even Leibnitz's ingenious hypothesis of preëstablished harmony could bolster up the belief in a strict causal correspondence between physical and mental events The psychological analysis of Locke, Berkeley, and Hume had later transformed the problem, and when nineteenth century psychology took the field, it had the great advantage over the Cartesians of coupling an improved physiological technique with a more refined method of psychological introspection. Withal, it was committed to psychophysical parallelism, and although this doctrine was discredited philosophically, it seemed to impose itself scientifically by the very necessities of experimentation

The orthodox method of explaining perception was to split up the problem into sensation, image, memory association, and attention The sensation was a unit element of psychological experience corresponding to a specific physical stimulus. As the sensation fades out of consciousness, it becomes a potential image, for the stimulus leaves a residue in the nervous system which is capable of arousing a faint copy of the original sensation. Since each sensation leaves behind it a separate residuum, there is a vast number of such residua in memory, each of which may be separately aroused, thus allowing for a certain independence of the original arrangement in which the sensations were experienced. At this point the doctrine of association is invoked to provide an *ad hoc* explanation for the selection of certain memories on the occasion of a particular stimulus instead of any others The doctrine of association dates back to Aristotle, and the reason for its long life is its ambiguous meaning, expressing as it does both a dynamic process and a static law of memory According to the doctrine, sensations or images tend to call up memory images which are similar or which have once been experienced in spatial or temporal contiguity with the present sensations or images All attempts on the part of modern psychologists to reduce similarity to spatio-temporal contiguity which could be measured quantitatively and statistically in the laboratory have failed. Now similarity of meaning in experience is not something that can be determined in advance, but *ex post facto* one may always say that a bond has become established between the old bit of experience and the new, in this case we are speaking of association as a dynamic process. It is questionable whether by this explanation we are really adding knowledge or whether we are not merely picturing the act of mnemonic imagination itself.

Similarity of meaning is thus seen to be the very nature of the associative process, for contiguity in time and space is but one of the lowest forms of this similarity and fortunately a form whose properties can be studied in advance of objective content. But for modern psychologists, as Koffka points out, meaning is itself explained by the working of associations which in themselves are meaningless. There is perhaps no better commentary on this attitude than the vast amount of experimental work which has been done on the memorization of nonsense syllables This work was performed on the theory that one was getting at the fundamental conditions of memory, but actually all that was accomplished was the formulation of statistical and contingent laws for the memorization of specific nonsense syllables, more laws and more nonsense syllables than even the most modern theories of education will have need for in the next 1000 years One may contrast with this type of experimentation the direct clinical methods invoked by the new psychology. So far from attempting to determine the conditions of memory and association along merely spatial and temporal lines, which must necessarily be limited at best to nonsense syllables, a psychiatrist like Jung attempts to determine concretely for a given person in a given situation the method behind that person's imagination. (See ASSOCIATION TESTS) He does this by noting down the random associations, together with any expressions of emotion, which certain words call forth from a patient The task here falls entirely on the psychiatrist, for there is no mechanical rule by which to measure the minds of all men; some general notions and a practical sympathy and skill on the part of the observer simply enable him to pic-

ture in his own mind the processes of his patient. It is, moreover, significant to point out the failure of the attempts made by Freud's disciples and by Freud himself to take the master's solution of specific dreams on the basis of certain symbolisms as scientific and all valid for all cases, instead of as suggestive examples to incite the use of one's creative imagination.

Turning now to attention, we find here the great scapegoat of experimental psychology. While every direct study of attention has sought to define it in terms of the stimulus and the physiological process, yet in experiments on perception it was treated as a mental element, as an unpredictable determining tendency which prevented the expected reaction from taking place. In short, so far from using a strict parallelistic procedure, experimental psychologists explained conscious phenomena in a physiological fashion whenever they could and then invoked mental concepts to explain discrepancies. Behind these mental concepts, such as attention, association, and memory, they indeed postulated corresponding physiological entities; but these were in no wise observable and amenable to scientific measurement. In Germany the school of the *Gestaltqualitat* or form quality, following up Wundt's conception of creative synthesis, had given up the attempt to maintain psychophysical parallelism in the higher mental processes. They emphasized the fact, well-known in music and duplicated in other phases of psychological experience, of the form of a perception existing over and above the so-called objective content. Thus a melody has a real quality over and above the physical notes of which it is composed, since it may be transposed to totally different notes, provided the order and rhythm are maintained. On this theory all higher perceptual acts are instances of forms which have reality of their own, although they are ultimately "founded" on sensations with their psychophysical relationship of stimulus and consciousness

Between the *Gestaltqualitat* psychologists, such as Meinong, Ehrenfels, and Witasek, and their radical descendants, the school of *Gestalttheorie*, there may be traced an evolution almost identical with that which occurred in philosophy in the descent from Locke to Berkeley and Hume. Locke began with sensation produced by external substances, and with reflection which the mind contributed to the ordering of its external impressions. Berkeley and Hume found the Lockian conception of external substances completely useless inasmuch as these substances could not be known except through the "higher" faculties of reflection, which in the nature of the case are subjective. And so the final result of the current of criticism which Locke started was the development of empirical or phenomenal idealism. In point of fact, what the *Gestalt* psychologists have done was to apply experimentally the idealistic criticism to structural and physiological psychology. Only recently Dr. J. S. Haldane, the eminent Oxford biologist, had publicly declared that although he was a physiologist he "could not for a moment agree with the assumptions on which what is called physiological psychology is ordinarily based. These assumptions appear to me as a mixture of very rudimentary physiology with a psychology which has been obsolete since Hume and Kant. It is doubtless the case that a very wide public is still ready to accept the assumptions in question, but a still wider public would accept the assumption that the sun goes around the earth." (*Proc. Aris. Soc.*, Sup. Vol. III, p. 65.)

Among the assumptions that Dr. Haldane had in mind is the constancy hypothesis, according to which a definite conscious sensation corresponds to every single stimulus. This assumption having been riddled experimentally by the proponents of form-quality, it remained for the more radical psychologists to show that the whole notion of an objective physical or physiological stimulus is quite misleading. They did this by reinterpreting in a new fashion the standard experiments with changing figures and perceptions of movement. In his laboratory studies of visual movement, Wertheimer showed how both the illusion and direction of movement could be obtained by preparing a pattern in the mind of the observer. Thus, if in the tachistoscope the experimenter exposes in succession two lines, first an oblique line making an acute angle with the horizontal, and then the horizontal itself, the observer will see the oblique line rotate in the direction of the horizontal, passing through the acute angle. Now if the experiment is repeated and the size of the angle is increased gradually until it passes a right angle and becomes an obtuse angle, the observer will still see the oblique line rotate in the original direction. If the experiment had been started with the oblique line making an obtuse angle, the illusion of rotation would have come about in the other direction, the illusion of movement being produced in the direction of the supplementary acute angle.

In the case of changing figures, which structural psychology had never been able to explain satisfactorily, even the subsequent distinction between form and objective content was valueless. Here there was no fixed physical content with a perceptual form superimposed, but rather there was an alternation of figure and ground, with the figure becoming the ground and the ground the figure when the meaning of the experience changed Add to these experiments the investigations of Köhler on the perceptual experiences of animals, the last resort of old-time physiological psychology, and the foundation was laid for a new systematic approach to psychological experimentation. The question which Köhler set himself to answer was this: if an animal is confronted with two stimuli and is trained to react positively to the one and negatively to the other, what has it learned? According to traditional theory the animal has formed a connection between the one sensation corresponding to the first stimulus and the positive reaction, and likewise between the other sensation and the negative reaction. Köhler, however, introduced an experimental variation which tested this theory. He placed before the animal two stimuli, *b* and *c*, the one lighter and the other darker, with variations in their spatial arrangement. From *b* food could be taken but not from *c*. After a certain amount of training, the animal invariably chose the positive *b*. Then this pair of stimuli was replaced by another pair, *a* and *b*, with *a* lighter than *b*. The animal now reacted not to the stimulus *b*, as the older theory would suppose, but to *a* as the lighter stimulus. The conclusion was

inevitable that animals learned to perceive structures and forms rather than identical physicochemical stimuli. The same set of experiments was repeated in the case of fowls, chimpanzees, and a three-year-old child, and the results were the same; this showed that the principle was sufficiently fundamental to be continuous in the biological realm.

The theory of perception which the new school of *Gestalt* psychology has built up is that in the act of perception the entire configuration is cognized and not an isolated object. If we see a specific object, we see it in much the same way that we appreciate the subject of a tableau. The centre or focus of the picture is unintelligible without the background. Carrying this analysis further back, the theory holds that in every act of perception the general psychological state constitutes the field or screen and the external stimulus the picture on the screen. Field and object are thus relative to one another, but the relation of relativity, if we may so speak, is not constant and predetermined. For certain configurations one may alter the background within various limits and not change the perception of the object. Again, object and background are relatively interchangeable but not absolutely so. This interchangeability or reversibility reaches its maximum in the case of the angular drawings and changeable figures mentioned above, which may be seen facing either "inward" or "outward at the will of the observer, provided his frame of mind has not been prepared According to this theory the experimental psychology of perception has for its task the determining of specific relationships existing between so-called objective stimuli and the various frames of reference in which they happen to be put. In other words, experimental psychological analysis would be no different from analysis of the artist who steps back from his picture and tries to see it at the distance from which it would be seen in the salon. The picture, we may say, remains the same, but the perception of the picture, which is what actually counts, varies in accordance as it is seen at six inches or at three feet distance, in accordance as it is seen with the eye of a connoisseur or with the untutored eye of the man in the street.

The *Gestalt* school has produced a number of echoes from America. R. M. Ogden in numerous articles expounded a theory of meaning embracing the general view of the new psychology. But the mass of experiments on perception will probably continue to be interpreted from the methodological approach of introspective structuralism with its postulate of psychophysical parallelism. See PSYCHOLOGY, GENERAL.

Bibliography. For the theoretical discussion of the problem of perception, consult the article by Kurt Koffka, "Perception: an Introduction to the 'Gestalttheorie,'" together with the appended references, in the *Psychological Bulletin*, vol. xix, 1922, p. 531. For additional references on the experimental side of perception, consult the *American Journal of Psychology*, vols. xxxiii and xxxiv, particularly the articles of F. L. Dimmick, M. Zigler, L. W. Cobbey, A. H. Sullivan, E. Bershansky, L. Knight, and E. Shults

PERIODIC SYSTEM. See CHEMISTRY.

PERKINS, FRANCES (1882–). An American sociologist, born at Boston, and educated at Mt. Holyoke College, the University of Pennsylvania, and Columbia University. From 1907 to 1909 she was secretary to the Philadelphia Research and Protective Association, and from 1910 to 1912, executive secretary of the Consumers' League. She was director of investigations for the New York State Factory Commission in 1912–13 and executive director of the New York Council of Organizations for War Service from 1917 to 1919. In the latter year she became a commissioner of the New York State Industrial Commission. She was a member of many sociological and economic societies and wrote *Life Hazards from Fire in New York Factories* (1912); *The Problem of Mercantile Fire Hazards* (1914); *A Plan for Maternity Care* (1918); *Women as Employers* (1919); and *A Social Experiment under the Workmen's Compensation Jurisdiction* (1921).

PERLIS. See MALAY STATES, NON-FEDERATED.

PERMANENT COURT OF INTERNATIONAL JUSTICE. See LEAGUE OF NATIONS.

PERNICIOUS ANÆMIA. See ANÆMIA.

PERONNE. See WAR IN EUROPE, *Western Front.*

PERRY, RALPH BARTON (1876–). An American philosopher (see VOL. XVIII). After 1914 he concerned himself largely with practical and ethical problems. His books, *The Free Man and the Soldier* (1916) and *The Plattsburg Movement* (1921), deal with the problem of military preparedness in a democracy. *The Present Conflict of Ideals* (1918) is a companion volume to *Present Philosophical Tendencies*, and surveys the clash of consciences in the contemporary world. Professor Perry's other publications since 1914 include *An Annotated Bibliography of the Writings of William James* (1920) and numerous studies in American and French philosophical periodicals.

PERSHING, JOHN JOSEPH (1860–). An American army officer, born in Linn County, Mo., and educated at the United States Military Academy. He served in the Apache Indian campaign in Arizona and New Mexico in 1886, in Cuba in 1898, and in the Philippines from 1899 to 1903. In 1905 he was with Kuroki's army in Manchuria. In 1916 he was appointed major-general. In 1917 President Wilson made him commander-in-chief of the American forces in France, and he conducted their operations in the War with conspicuous success. In 1915 the tragic loss of his wife and three daughters, who were burned to death in a fire during his absence, roused the sympathy of the country. He was appointed chief of staff of the United States Army in 1921 and retired on Sept. 12, 1924.

PERSIA. A monarchy of southwestern Asia extending north from the Persian Gulf and the Gulf of Oman to the Caspian Sea. Area, variously estimated at from 628,000 to 635,135 square miles; population, from 8,000,000 to 10,000,000. The population was polyglot, and being scattered in widely separated centres, was difficult of control. In the west, Kurds, Armenians, and Arabs were to be found; in the northeast, Turks from Russian Turkestan; along the shores of the Persian Gulf, Arab and Negroid elements. Nomads numbered about 3,000,000; Europeans, 1200, of whom 600 were British. Populations of the principal cities were estimated as: Teheran, the

capital, 220,000; Tabriz, 200,000; Isfahan, 80,000; Meshed, 70,000; Kerman, 70,000. About 90 per cent of the population were Mohammedans of the Shiah sect.

Industry and Commerce. The large desert areas and the dependence upon irrigation for the cultivation of crops accounted for the comparative unimportance, economically, of agriculture. Grain crops and rice were raised for local consumption, while fruits, tobacco, cotton, and opium were exported to some extent. The keeping of sheep and sericulture supported the native carpet and silk stuff establishments. Wool and prepared skins also entered into the foreign trade. Mineral resources were extensive and included oil, iron, coal, copper, lead, manganese, marble, nickel, and cobalt, though none was worked except oil. The Anglo-Persian Oil Company (controlled by the British government) held concessions covering all but five northern provinces and though the workings were as yet confined only to a single area, the wells yielded 2,959,000, tons in 1922–23 and 3,775,000 tons (estimated) in 1923–24. The indications were that the Persian oil fields were among the richest in the world. In December, 1923, it was reported that the American company, the Sinclair Consolidated Oil Corporation, had received concessions in four of the five northern provinces. Complete ratification was to depend, however, on the approval of the Persian Parliament as well as on the ability of the American group to raise a loan of $10,000,000 for the government. The importance of oil in the economic life of the country may be gauged from the fact that while before the War its export was negligible and in 1915–16 was valued at only 21,758,000 krans (1 kran = 9 cents), by 1922–23 the oil export totaled 429,000,000 krans, being nearly 60 per cent of the entire exports. Exports for 1913–14 were 455,839,635 krans; imports, 647,164,841 krans. For 1922–23 exports were 733,982,943 krans and imports 619,201,046. The changing emphasis in the economic life was indicated by the following comparative figures in articles exported for 1913–14 and 1922–23 (in thousands of krans): fruits, 70,000 and 34,000; carpets, 54,000 and 93,000; cotton, 85,000 and 17,000; rice, 42,000 and 13,000; opium, 38,000 and 41,000; skins, 12,000 and 10,000; petroleum, 17,000 and 429,000. Leading imports remained cotton tissues, sugar, tea, yarn. Up to 1917 the country was barely touched by the War but following that year it suffered severely. The presence of the demoralized Russian troops through 1917, the depredations of the Turk in Azerbaijan and the rich plains of the Urumiah, and the flight of the Assyrian Christians accounted for great losses. Drought and famine visited the country in 1917; the influenza took its toll in 1918. Flocks and herds fell off greatly and through the shortage of forage many beasts of burden were lost. The interruption of commerce with Russia visited great distress on all industries. Before the War, imports from Russia totaled 355,000,000 krans and exports to it, 300,000,000 krans; in 1922–23 imports were 73,446,237 krans and exports 62,122,678, showing considerable improvement over 1921–22. Great Britain, Egypt, and Mesopotamia had in the interim forged ahead so that by 1922–23 they were taking the great proportion of the Persian products and supplying as well most of the country's wants. In 1922–23 exports to the United States were about $5,000,000; imports about $500,000. These more than trebled the 1913 trade.

Communications. Internal transport was carried on by caravan. To 1914, only 6 miles of railway were in existence. In 1916, a Russian constructed railway from Julfa (Perso-Russian frontier) to Tabriz (85 miles) was opened; another line from Pirebazar to Resht, 7 miles long, was also opened; a military railroad in southern Persia, 52 miles long, was constructed from Bushir to Borazjan; the railroad from Quetta to Nushki, in India, was extended to Duzdab. The total railway mileage was 350 miles. Before the War, Great Britain and Russia had launched ambitious projects for the railway development of the country, but the collapse of Russia and the outbreak of the War made the realization of any programme impossible. But the dependence of the economic exploitation of the country upon a decent system of transport turned British capitalists once more to the railroad problem. A scheme for a line from Teheran to Kuraitu on the Persian frontier to connect with the Kuraitu-Bagdad line and thence with the whole Bagdad system was under consideration.

Finance. The latest available figures for revenues were those of 1912–13 which amounted to £1,055,792. The increase in revenues may be ascertained from the gross customs receipts (a little less than half the total receipts) which were £1,398,725 in 1920–21. In addition to the loans made before the War, the following foreign debts were contracted British advances, 1912–14, £490,000, Russian advances, 1,891,500 rubles; British advances, 1915–17, £817,000; ditto, in krans, 1,000,000; ditto, 1918, in krans, 92,500,000; British loan of 1919, £2,000,000 (not advanced). By the treaty with Soviet Russia, of 1921, all Russian loans and advances were canceled. In 1920, a British financial adviser was appointed to the Persian government but he never actively functioned; in 1922, because of the increasing friendliness toward the United States, an American adviser was attached to the administration The first year's activity, 1923, showed a balanced budget, an increase in revenues by a better control of assessment and collection, and a movement toward the revision of taxation. The 1924 budget estimate carried $20,700,000 for revenue and $20,661,500 for expenditure. The Russian Banque d'Escompte was, in March, 1921, handed over to the Persian government by the Soviet officials as a result of the understanding that had been effected.

Army. The refusal of Persia to ratify the Anglo-Persian agreement of 1919 which provided for a uniform military force under British officers caused the collapse of the military establishment. All British officers and men were withdrawn after 1921. It was fortunate, for internal security, that the American fiscal commission was able to put finances into a decent order and allow for the creation of an army; it was equally fortunate that Persia had at hand an administrator to construct an efficient machine almost overnight. Under Riza Khan, and aided by an appropriation of two-fifths of the annual income, an army, with tanks, airplanes, mobile artillery, and wireless, was created, which in three years was able to pacify the province of Khorassan, disband the followers of the bandit Kuchik Khan, and the

Kurd robbers on the west, and subdued the long defiant Sheik of Mohommeseh. Pacification and tax-collecting went hand in hand.

History. That Persian Azerbaijan should become a theatre of war was inevitable in spite of the declared neutrality of the government. Turks aided by the Kurds marched on Tabriz and took it in January, 1915, only to be driven out soon after by Russian forces. Urmia was the scene of severe fighting in 1915, the Christian inhabitants in particular suffering at the hands of Kurds and Turks. Meanwhile British forces, beginning operations to the southwest in Mesopotamia, pushed into Persia to defend the pipe lines running from the oil wells at Maidan-i-Naftun and here encountered tribesmen in sympathy with the Turks The British were successful in expelling the hostile forces who fell back on Amara, thus leaving southwest Persia clear In the west and north the struggle continued between the Turks and Russians In 1916 the Turks had succeeded in dislodging the Russians from Kermanshah and Hamadan, which they held until the end of the year. In 1916, on the other hand, British operations became more aggressive A column under Sir Percy Sykes marched from Bandar Abbas to Kerman, put an end to the German influence among the tribesmen, and then penetrated into the heart of Persia to Isfahan Throughout 1917, Sir Percy Sykes worked effectively in the restoration of order in the province of Fars. Looting was stopped and the caravan routes opened Early in 1917, the fall of Bagdad in Mesopotamia had rendered the Turkish position at Kermanshah a precarious one so that a retreat back to the frontier followed. The British now pushed north to effect a juncture with their Russian allies but the disintegration of the Russian forces after the Russian Revolution put an end to what seemed an easy triumph The danger to India now seemed indeed real The impossibility of dispatching a heavy military force to the northern Persian frontiers compelled the British to resort to political measures. A mission was sent into the north in 1918, its objective being Baku, but was compelled to stop at Enzeli on the Caspian Sea, and then soon after, to retire to Hamadan. In the autumn the mission, reinforced, held Baku for a time, but Turkish forces compelled it to fall back on Enzeli once more. Meanwhile a second mission, working its way from Afghanistan through the northeast, reached the Transcaspian province in Turkestan and united with the Mensheviks against Soviet Russia. However, southern Persia once more began to present a serious problem. In early 1918, the Kashgais tribesmen in force attacked Sir Percy Sykes's small column at Shiraz and for months the British position was a precarious one. The support of the Persian government and the preaching of a holy war for a time presaged the complete destruction of the British unit But some sensational successes, and the gradual defection of the tribesmen, effected a triumph for Sir Percy Sykes and by October, 1918, the Kashgais were completely overthrown. The route from Bushire on the Persian Gulf to Shiraz was reopened by 1919

The continual presence of the British in the country, with the threat of complete submergence now that the Russian hold had been broken, prompted Persian leaders to appeal their case to the Peace Conference. Their demands included complete economic and political independence, territorial expansion, and reparation for the very heavy losses suffered at the hands of the warring nations. British intervention, however, prevented the presentation of these matters before the Conference so that the way lay clear for the Anglo-Persian Treaty of August, 1919. By the terms of this convention, the British government promised to respect the independence of Persia—with the following reservations: the British government was to supply expert advisers to the Persian government at the latter's expense; the British government was to furnish and equip a military force for the preservation of order in the country and on the frontiers, the British government was to grant a loan to be guaranteed by the customs revenues and other sources, railroads were to be built by British enterprise; the tariff was to be revised by Persian and British experts The agreement never received ratification, however. The growing influence of Soviet Russia in Persia strengthened its irreconcilable temper. In May, 1920, Bolshevist forces occupied Enzeli and by the end of the year the greater part of the province of Gilan was under their influence. The growing movement against Great Britain finally forced the British evacuation of Kazvin early in 1921; the last remnants of British participation in internal affairs disappeared with the departure from the capital of the British controller of Persian finances and the disbanding of the South Persian Rifles (September, 1921). In March, 1921, a treaty between Russia and Persia was signed by which diplomatic rights were accorded to the former while the Russian loans and advances were completely canceled, Russian concessions were abrogated, and Russia's special rights in the northern zone under the Anglo-Russian agreement of 1907 were renounced, the Capitulations were terminated, and the Russian discount and land bank was turned over to the Persian government. Free from Anglo-Russian domination, Persia in 1921 again turned to the United States for unofficial assistance and obtained the services of an American, Mr. A. C. Millspaugh, as financial adviser; other American experts were secured to aid in sanitation In 1923, boycotts were launched against British goods as well as imports via Mesopotamia. In this case anti-British sentiment was accentuated by a boundary dispute which opened old sores, for negotiations were begun regarding the revision of the former Turco-Persian frontier In measure as the Persian leaders grew more antagonistic toward Great Britain, they displayed a definite orientation toward the United States. The success of Mr. Millspaugh in reorganizing Persian finances and the cordial cooperation of Persian authorities with American experts helped to strengthen this policy Moreover, in the hope of securing ready capital, of which the country stood in desperate need, the government turned to American oil companies There ensued a tortuous series of quasi-diplomatic oil negotiations. When, in 1921, the Standard Oil put forth claims to exclusive oil exploitation in the five northern provinces, the Anglo-Persian Oil Company countered by presenting concessions which had been obtained by a certain Russian, Khostaria, in 1896 and 1916, and sold by him to a subsidiary of the Anglo-Persian; but the latter was willing to compromise by sharing the northern field equally with the

Standard. The Persian Mejliss, however, discountenanced this amicable arrangement, and, in December, 1923, the Persian government made a preliminary contract with the Sinclair interests for oil exploitation in four of the northern provinces, on condition that the concessionaires advance $10,000,000.

It was natural that the ferment of nationalism should begin to work soon in internal affairs. Young Persians, learning their lesson from Western methods, gained control of the government early in 1923 and agitated for a strengthening of the military establishment. Riza Khan, the leader of this movement, became prime minister on October 25, and with funds gained as a result of the fiscal reforms effected by the American controller, applied himself to reorganizing the army and establishing domestic tranquillity. Press reports early in 1924 indicated that the premier was fostering a republican agitation, inspired doubtless by the example of Nationalist Turkey; but so strong was the monarchist sentiment of the more conservative classes that Riza had to content himself with the deposition of the reigning but absentee Shah, and the succession of the latter's infant son to the throne.

PERU. A South American republic on the Pacific coast between Ecuador and Chile. No official census was taken after 1876, with the result that estimates must be unscientific in the extreme An estimate in 1922 put the population at 4,620,000 (as compared with 2,597,604 in 1876), though any increase in population was questioned in many quarters. The boundaries in 1924 were not definitively settled, estimates placing the area at from 679,600 to 722,461 square miles Lima, the capital, has a population of 173,000 and Callao, 52,000, according to a census of 1920; Arequipa was estimated to have a population of from 35,000 to 40,000.

Industry and Trade. Sugar, cotton and coffee continued to occupy the most important places in Peruvian agricultural life. Cotton culture in 1921 brought in 36,000 tons as compared with a crop of 26,170 tons in 1913. The values of cotton exported in the two years were: 1913, 1,424,000 Peruvian pounds; 1920, 11,190,061. In 1923, the value was 6,027,849 Peruvian pounds. The 1923–24 crop was greatly reduced by a severe drought. (The Peruvian pound equals the pound sterling at par. On Jan. 1, 1920, it stood at $4.74; in 1921, it averaged $3 64; in 1922, $4.10; in 1923, $4:135) Sugar production in 1921 totaled 300,000 tons as compared with 192,754 tons in 1912. Sugar exports in 1913 were valued at 1,380,000 Peruvian pounds; in 1920, 15,584,888; in 1923, 6,266,209 Among the minerals, copper up to 1920 occupied the leading place, the 1920 output being 32,982 metric tons with a value of 2,358,243 Peruvian pounds. This showed a negligible gain over 1913 output. The production in 1922 was 36,408 tons. On the other hand, petroleum production in the decade 1914–24 forged steadily ahead so that by 1920 the value of the output exceeded that of copper. In 1905, the petroleum production was worth not much more than £p125,000. In 1920, it reached £p2,494,570 and in 1921, £p3,618,955. In 1923, petroleum was exported to the value of £p4,446,561. Other important industries included: silver, vanadium ore, wool, cacao, guano, coca, and the making of Panama hats. Exports totaled $165,929,441 in 1920, $93,464,350 in 1922, and $99,037,331 in 1923, as compared with $45,871,504 in 1912. The leading imports were, in 1923, foodstuffs, cotton goods, metal goods, and machinery of all kinds. Imports for 1920 were valued at $86,283,654, for 1922 at $52,962,770, for 1923 at $58,437,089 as compared with $25,015,460 in 1912. The excess of exports over imports regularly mounted during the decade 1910–20, reaching the high figure of $79,645,787 in 1920. In 1921, for the first time the trade record showed an unfavorable balance of $42,520 In the period 1910–24, the United States forged ahead of Great Britain in Peru's commerce. The typical years shown in the table reveal the situation (in Peruvian pounds).

VALUES IN PERUVIAN POUNDS

	Imports from Great Britain	Imports from United States
1910	1,676 543	1,128,395
1914	1 598,605	1,570,723
1917	1,934,665	8,792,710
1920	2,694,195	10,168,937
1922	2,024,903	4,212,971
	Exports to Great Britain	**Exports to United States**
1910	3,403,127	2,032 510
1914	3,403,109	3 033 259
1917	3,792,750	10 942 407
1920	12,681,632	16,265,092
1922	6,592,071	6,582,712

In 1913, the United States furnished 28.8 per cent of the imports and received 33 2 per cent of the exports of Peru. In 1923, that country furnished 40.4 per cent of Peru's imports and took 40.1 per cent of Peru's exports. Other countries took the following portion of Peruvian exports: Great Britain, 32 9 per cent; Chile, 8.7 per cent; Argentina, 3.6, and Germany, 3 per cent. Great Britain supplied 20 2 per cent of Peru's imports, Germany, 10.5, Italy, 4.2, and Argentina, 3.7 per cent.

Communications. In 1922, there were 1935 miles of railway in operation. This was a gain of 216 miles over 1912. The Peruvian merchant marine consisted of only 15 steamers of 14,248 tons. The trade of the country was carried in foreign bottoms, the nationality of the 575 ships calling at Callao in 1921 being: 179 British, 106 Chilean, 25 Japanese, 112 American. In March, 1921, the Marconi Company took over the management of the Peruvian postal, telegraph, and wireless services for 25 years. In 1920, there were 8817 miles of telegraph line, 723 post offices and 19 wireless stations

Finance. In 1922, the revenues of the government amounted to £p7,032,506 and expenditures to £p8,083,183 (compare with the 1912 figures of £p3,425,543 and £p3,493,629). In 1913, the internal debt amounted to £p3,792,855, and in 1921 to £p4,641,290; the foreign debt in the two years was £p1,162,700 and £p934,840; the floating debt, £p5,302,457 and £p2,261,644. On Dec. 31, 1922, the total debt had increased to £p11,125,093 This was due to two loans contracted in 1922: a petroleum loan of $2,500,000 and a guano loan of £1,250,000. In 1922, also, a bill was passed authorizing a sanitation loan of $25,000,000. In the same year an important step was taken for the stabilizing of business affairs in the creation of the Reserve Bank of Peru (Banco de Reserve

del Peru), a central bank of issue and discount.

Government. Up to 1920, internal affairs were the exclusive concern of the central government located at Lima, and provincial matters were handled through a corps of prefects and subprefects, responsible entirely to the president. The new constitution of Jan. 18, 1920, the result of a movement toward decentralization, provided for the installation of three regional congresses in the north, south, and centre, with considerable local autonomy. The president's term was increased to five years and he was made ineligible for a succeeding term. (This provision was amended in 1923 to permit one reëlection.) The number of senators was fixed at 57; deputies at 128. An important step taken was the grant of absolute political and religious liberty, though Roman Catholicism was still retained as the state religion.

History. During the administration of Dr. José Pardo, 1915–19, Peruvian affairs centred, of course, on two main concerns; i e. the War, and the country's economic status which was so much dependent upon foreign markets. In spite of sympathies for Germany which so many of the upper class entertained, the infectious democratic doctrine of President Wilson gained great popularity in Peru, with the result that diplomatic relations with Germany were broken in 1917. After a single year's depression, 1915, Peru rapidly adjusted itself to the war situation, its raw products being greatly sought after by the belligerents; so that by 1919 imports had doubled, and exports trebled the figures of 1913 Because of its favorable trade balance in 1917, Peru received $13,505,-068 in bullion from the United States. The disputed election of May 18, 1919, resulted in the seizure of President Pardo by adherents of Augusto B. Leguía and the installation of the latter, first, as provisional president, and then as regularly elected president. Under Sr. Leguía (1919–24) ambitious projects were set under way for the modernization of the country. The president, committed to an extension of the federal principle, promulgated the new constitution (above) and invited foreign countries, through expert commissions, to participate in Peru's reconstruction. An attempt was made to attract immigrants in 1919 by an offer of free transportation; the construction of the Ayacucho-Cuzo railway to put the capital in touch with southern Peru was pushed; and a movement was made to withdraw the paper notes issued during the War for the establishment of a stable currency. In 1921, negotiations were started with a British-Canadian company for the construction of some 1500 miles of railway in various parts of the country. In 1922, a programme for important irrigation works was projected to centre around the Cañete and Moche Rivers. An American sanitary expert, beginning with 1919, was given full powers to stamp out malaria and yellow fever, and in 1919, General Gorgas was requested to undertake the sanitation of Peru's important cities. The General's death temporarily checked the plan. The reorganization of the army during 1919–21 was placed in the hands of a French commission and the navy, in 1920, under an American commission with full powers. In 1921, several American educational experts went to Peru and one of their number was made director of instruction. Finally, the beginnings of a labor code were attempted in 1924 with the passage of laws for workmen's compensation and the arbitration of industrial disputes. Results of these progressive activities were at once evident. By 1922, foreign interest had increased so enormously that it was estimated British holdings totaled $125,000,000, American $90,000,000, Italian $50,-000,000 and German $10,000,000.

In South American affairs, Peru's position was affected by its long outstanding controversy with Chile over the Tacna-Arica provinces. For the ramifications of this dispute see CHILE, BOLIVIA, TACNA-ARICA. The protocol signed by the disputants at Washington on July 15, 1922, to hasten the arbitration of the controversy was accepted in October by the Peruvian national congress, though by 1924 no settlement had yet been effected. Other boundary questions were settled more amicably; that with Bolivia in 1912, that with Colombia in 1922, and in the same year the Brazilian frontier.

PESTS, INSECT. See FORESTRY; HORTICULTURE.

PETAIN, HENRI PHILIPPE (1856–). A French army officer, educated at the Ecole de Guerre. In 1914 he headed an army corps in masterly retreat from Charleroi to the Marne, and in 1916, in command at Verdun, he defeated the great effort of the Germans to capture it. He became commander-in-chief of the French forces on the western front, May 15, 1916; infused new life and spirit in his men, maintained close relations with his allies in the same field, and struck the Germans with great energy at Verdun in August and at Chemin des Dames in October. He was made marshal of France at the end of the war and also became vice president of the Conseil Supérieur de la Guerre. See WAR IN EUROPE.

PETRIE, SIR WILLIAM MATTHEW FLINDERS (1853–). An English Egyptologist (see VOL. XVIII) He continued his excavations in Egypt till 1920. Among his later writings are: *Amulets* (1914); *Heliopolis* (1914); *Scarabs* (1917); *Tools and Weapons* (1917); *Eastern Exploration* (1919); *Some Sources of Human History* (1919); *Prehistoric Egypt* (1920); *Social Life in Ancient Egypt* (1923). See ARCHÆOLOGY.

PETROLEUM. In the ten-year interval from 1914 to 1924 few industries had experienced so great a development as that having to do with the production, refining, and utilization of petroleum. In 1913 the world's total production amounted to 385,347,000 barrels of 42 United States gallons, but by 1923 this had increased to 1,010,995,000 barrels, of which the United States produced 735,000,000, or 73 per cent of the total output of the world. The unprecedented demand for petroleum was due in great measure to the widespread use of the internal-combustion engine, especially as employed in motor vehicles. Along with this increased demand had come improved processes in refining as well as the exploitation and development of new fields. Outside of the United States, Mexico was the greatest producer, supplying, in 1923, 149,472,000 barrels, though in 1921 it had achieved a record of 203,521,000 barrels. From 1913 to 1923 Rumania had dropped from 13,554,000 barrels to 10,930,000, and Russia from 62,834,000 to 38,167,000. Persia on the other hand had increased from 1,-857,000 to 27,300,000, the Dutch East Indies

from 11,172,000 to 15,000,000, Peru from 2,133,000 to 6,375,000, and Argentina from 130,000 to 3,330,000 barrels

At the end of 1913 the total assets of the American petroleum industry were $1,136,718,000. At the close of 1921 they had increased to $6,383,632,000, and at the end of 1923 the total assets were estimated in excess of $9,000,000,000. In the 10 years from 1914 to 1924 the petroleum industry in the United States had attracted new capital to an amount between $2,500,000,000 and $3,000,000,000 which was used in the opening of new fields, for such purposes as drilling, pipe lines, and storage, not to mention the erection and equipment of numerous refineries.

In the decade under review one of the most important influences on the American petroleum industry was the great increase in the number of automotive vehicles (See MOTOR VEHICLES.) On Jan. 1, 1914, there were in operation in the United States 1,250,000 automobiles, which, by the close of 1923, had increased to more than 15,250,000, or a gain of 1100 per cent, while so far as the refineries were concerned the increase in the amount of crude oil to run them was but 176 per cent. In 1913 the average consumption per day in the United States averaged approximately 573,000 barrels, as compared with 1,592,000 barrels in 1923. The improvement in technical processes, and in particular the evolution and development of the cracking processes, brought a yield of 12 5 per cent of naphtha from the crude oil in 1913, up to nearly 31 per cent in 1923.

Important American Oil Fields. The years 1914–24 saw the development of many important fields in the United States, especially in California, Oklahoma, and Texas. Previously the most important fields under production had been the Sunset Midway in California, which was developed in 1900 and at the close of 1913 produced 140,000 barrels daily; Healdton, in Oklahoma, which came in early in 1912 and was producing 40,000 barrels; and the famous Cushing Pool in Oklahoma, which was producing in excess of 180,000 barrels, reaching its maximum in 1915 with 310,000 barrels. The Salt Creek oil field in Wyoming had been opened up in 1912, when it produced less than 20,000 barrels daily. Another important field developed in this period was the Santa Fé near Los Angeles, in California. It established a record of 340,000 barrels per day. Then Powell, Texas, brought into production in the latter part of 1921, and destined to be the world's largest producing field, produced a maximum of 315,000 barrels in the middle of 1923, but this declined in a few weeks to 145,000 barrels In 1915 both Augusta and Eldorado, Kan., were important fields which came into production, and in 1917 the Burkburnett, Texas, oil fields were added In 1917 came the Ranger oil field, also in Texas, and in 1918 and 1919 there followed West Columbia, Hull, and Desdemona, all in Texas, Hewitt, in Oklahoma; and Homer, in Louisiana.

The famous Huntington Beach field in California began production in 1919 and by 1923 had increased its output to 115,000 barrels In 1920 Burbank, Okla., an important mid-continental field, was brought in. Two other fields of that year were Eldorado, Ark., and Haynesville, La., together with Long Beach, Cal, Mexia, Texas, and Tonkawa, Okla Another field developed early in 1922 was Smackover in Arkansas. In 10 years the American petroleum industry had developed 23 active pools of major importance, of which all but two reached a maximum and then fell back to a position of secondary importance. The important petroleum fields in California contributed materially to the increasing production of the United States, but it was the opinion of geologists that the maximum production in California would soon be reached, as at the end of 1923 all the fields except three had passed their peak; and although new fields might be discovered and developed, it was thought that the final decline would be rapid when it came.

Mexican Production. In Mexico, the development of oil had begun only since 1901, with the first shipments taking place about 1904 In 1913 the total production had reached 25,696,000 barrels, of which 21,330,868 were exported. By 1921 it amounted to 193,398,000 barrels, from which it had declined to an output of about 150,000,000 barrels in 1923 This extraordinary decline seemed to indicate that the production of several of the producing areas in Mexico was at an end and that another source of bunker fuel oil must be looked for.

Persian Oil Fields. An even more rapid development has taken place in Persia, where petroleum on a commercial basis was not produced much earlier than 1913, when 1,758,000 barrels were produced. By 1923 this output had increased to approximately 27,300,000 barrels, and there were in operation pipe lines for delivering the oil to Abadan, at the head of the Persian Gulf, whence tank steamers carried the crude oil to the refinery of the Anglo-Persian Oil Company at Suez, which supplied the market of the Near East Crude petroleum was also loaded on tankers for shipment to Europe, and during the year ending July 31, 1922, a total of 69 tankers carried 607,248 tons of crude oil in bulk, passing northward to the Suez Canal and bound from the Persian Gulf ports for Swansea in Wales, where the Anglo-Persian Oil Company had constructed and completed in 1922 a refining plant, one of the largest in the world outside of the United States and Mexico With this plant and with other refining works contemplated in England, this company, which enjoyed the support of the British government would soon, it was believed, be in a position to take care of the demand for petroleum products throughout the British Isles.

The wells of this company are in the Maidan-i-Naftun district, about 50 miles northeast of Ahruz on the Karun River, and in 1922 they produced in excess of 50,000 tons a month. In addition to these fields, which lie in southeastern Persia, there are important other fields in northern and eastern Persia for which the Anglo-Persian Company in 1923 were applicants for concessions, as were also the Standard Oil Company of New Jersey and the Sinclair Consolidated Oil Corporation. The Persian government objected to additional grants to the Anglo-Persian Company on the ground that further influence in Persian affairs was not altogether wholesome, and accordingly the concessions at the end of 1923 for the absolute control and development of oil deposits of four of the northern provinces of Persia was awarded to the Sinclair Consolidated Oil Corporation. The government retained one of the northern provinces for its own purposes. Naturally such rich oil fields attracted the large

oil corporations, and their respective governments were active in their behalf. See PERSIA.

South American Petroleum. In South America there had been developments in several of the states, and the large world oil companies were looking for concessions wherever conditions were promising. In Peru the production in 1923 was estimated at 5,508,985 barrels, an increase from 2,071,000 in 1913, and oil concessions were sought in the departments of Amazonas, San Martin, Loreto, and Pinra. In Colombia a law of Jan. 31, 1923, made more liberal land-leasing regulations, and numerous American companies were seeking concessions. After Peru, the leading South American source of production was Venezuela, which had developed rapidly up to some 4,000,000 barrels, and the Argentine Republic, where out of an estimated production of 3,200,000 gallons, the government reserve at Comodoro Rivadavia, which first became an important producer in 1914 with 275,131 barrels, contributed some 2,343,000 in 1923 The government owned and operated a fleet of five tankers with a capacity of more than 27,000 tons of oil, which transported the oil from the port of Comodoro Rivadavia, 1000 miles south of Buenos Aires, to that city, and to Rosario, Sante Fé, Bahia Blanca, or other cities where storage facilities are maintained.

Transportation of Oil. That the American oil industry is highly organized is particularly evident in connection with the transportation. At the very outset there were required pipe lines, which take the oil from the wells and carry it to the refineries where it is treated. From a total mileage of a little less than 40,000 at the close of 1913, the American pipe lines had increased to approximately 75,000 miles at the close of 1923 This figure represented all the pipe lines employed by gathering and transporting companies engaged in the business of carrying oil. The main oil pipes alone aggregated in excess of 34,000 miles. These pipe line companies must either build into a new field or extend their existing lines to take care of the new production. In 1923 about 2,000,000 barrels of crude oil were gathered and transported for producing purposes every 24 hours, if moved in tank cars, this amount would have required at least 10,000 such carriers on sidings adjacent to the fields every day in the year. Of course a certain number of tank cars are employed to move the crude oil or the subsequent products, and in 1921 approximately 137,500 tank cars were so employed in the United States and Canada for this purpose

Marine Transportation. As California increased its crude oil production, it developed storage and bunkering facilities at Los Angeles harbor. It was found that oil could be shipped from Californian ports by tank vessels through the Panama Canal eastward cheaper than the pipe line charges from the mid-Continent fields to the same destination. Likewise it could compete with oil brought to the Atlantic coast of the United States from Mexico, notwithstanding the fact that each shipment involved a round trip of approximately 10,000 miles. As the distance was so much greater, more than twice the tonnage necessary to transport the same amount of oil from Mexico to the Atlantic coast refineries must be employed in this traffic. Nevertheless in 1923 tank steamers made a total of 1704 transits through the Canal and constituted about 34 per cent of the total number of ships passing through the Canal during the year. These vessels paid an aggregate of nearly $9,000,000 in tolls, or 39 per cent of the total annual revenues. Their movement, both ways, aggregated 9,625,714 tons of cargo, 38 per cent of the total shipment through the Panama Canal. A modern tank vessel can now be loaded at the rate of 25,000 barrels per hour and discharged at a rate of 10.000 barrels per hour, or 6 and 14 hours respectively for a tanker of 140,000 barrels capacity. The use of these tankers has not been exclusively to transport oil from the oil fields to refineries but also for the use of oil-burning ships, which have increased materially in numbers and capacity in the merchant marine not to mention the various navies. In 1913, out of a total world's merchant tonnage of 24,444, 23,779 burned coal. In 1923, out of 29,246 vessels 24,380 burned coal and 4866 burned oil, or an increase in oil-burning tonnage of 1030 per cent as against the two per cent increase in coal-burning tonnage It was estimated that the fuel consumed by such vessels in 1913 was less than 3,000,000 tons, whereas for 1923 it was over 23,000,000 tons, or an increase of 710 per cent, while the consumption of coal for steamship bunkers increased to 3 per cent. See INTERNAL-COMBUSTION ENGINES.

Increase in American Refining Capacity. In 1913 the total consumption of crude oil in the refineries in the United States amounted to 573,000 barrels. Ten years later this figure had risen to 1,587,000 barrels, and from this amount nearly 150,000,000 50-gallon barrels of naphtha, or nearly 31 per cent of the crude oil handled, were obtained, whereas in 1913 a volume of about 22,000,000 50-gallon barrels, or 12 5 per cent naphtha, was obtained from the crude oil distilled. The chief reason for this large increase was the development of the cracking process, designed to secure the largest possible amount of naphtha, as previous to 1913 the crude oil treatment was mainly with the object of producing illuminating oil. With the production of naphtha limited to the natural naphtha content of the crude oil, and the small percentage secured through cracking or decomposition of the heavier applications in the ordinary fractionated still, in order to secure a greater output of gasoline and in view of the fact that there was no adequate outlet for the production of the other products, a pressure still was developed by Dr. W. N. Burton of the Standard Oil Company, in which "cracking" could be carried on in an efficient manner, so that in 1922 about 25 per cent of the total gasoline production of the United States was obtained through cracking at pressures above that of the atmosphere.

In 1923 there were something like 2000 pressure cracking units of various designs in operation, with an estimated production capacity of 45,000,000 50-gallon barrels of naphtha a year, about twice the total production of naphtha in 1913. The annual production of naphtha would be divided approximately somewhat as follows: 132,000,000 barrels of crude oil in refinery operations, 22,000,000 barrels recovered from natural and casinghead gas, and 40,000,000 barrels in cracking operations at or above atmospheric pressures The demand for gasoline with the increased number of motor vehicles, tractors,

airplanes, motor boats, etc., led to the development of various means to provide gasoline in addition to those mentioned. In the first place it was found possible to remove the light volatile naphtha from natural gas and then at the crude oil wells at so-called casinghead plants, where absorption by compression methods was used to save the light naphtha, and finally a combination of these last two methods. This work was developed so that where once it was hardly possible to handle the volatile naphtha on account of evaporation loss, and it was permitted to go back into the gas system for burning as fuel, there were derived in 1923 about 22,000,000 42-gallon barrels by these methods. (See NATURAL GAS.) Another method of extracting gasoline was to treat the noncombustible gases in the refinery operations, where the gas had been previously burned as fuel, and then the development of cracking methods where pressures up to 350 pounds or more were employed, where, as in the case of the Standard Oil Company of New Jersey's processes, it was found possible to crack the whole range of petroleum products from refining distillate to the heavy fuel residues of the crude oil itself.

Oil Production. Reference has been made to the increase in the amount of gasoline products and the decline in the amount of illuminating oil This is also shown in the export statistics of the United States, where, in the year 1913, there was a total of 40,751,416 50-gallon barrels of crude oil and products exported, of which 23,388,825 barrels were illuminating oil and 3,760,867 barrels were gasoline, in addition to which there were over 7,000,000 barrels of gas oil and fuel oil During the War, when some 90,000,000 barrels of oil were used in the fighting area, of which at least 95 per cent was American oil, the export figures of course were abnormal, but up to the year 1923 the total exports had reached 79,743,740 barrels, an increase of 96 per cent over the 10 years previous. At this latter point the exports of illuminating oil (kerosene) were about 17,000,000 barrels, or but three-fourths of what they were in 1913, while the exports of gasoline, naphtha, and other oil products amounted to nearly 17,000,000 barrels, or a 350 per cent increase, and the exports of gas oil and fuel oil amounted to 24,571,880 barrels, or a 242 per cent increase.

Fuel Oil. By 1913 the Mexican crude oil, the production of which in that year amounted to 25,696,000 barrels, not only became available in quantity but with the increased output could be used for fuel oil for steamship bunkers. This led to the extensive use of fuel oil in the shipping industry of the world and also for boiler furnaces. The method of treating the Mexican oil is to top the lighter crude oil for naphtha, retaining perhaps 85 per cent of the crude for fuel oil, while in the case of the heavier Mexican crude oil it has been topped merely to give the necessary flash test. In 1914 the gas and fuel oil business of the United States amounted to 74,681,000 50-gallon barrels, while in 1923 the United States Bureau of Mines recorded its business as having increased to 241,483,834 barrels. In connection with the Mexican crude oil it was possible to derive a number of asphalt products used for roofing, street paving, and other purposes. This asphalt business, which in 1914 was 465,000 tons, in 1923 had increased to 2,373,000 tons. See ASPHALT.

Public Aspects of the Industry in the United States. It has already been suggested that the great demand for petroleum and petroleum products which developed in the 10 years following 1914 led to many national and international political developments. It was realized that the supply of oil was variable and that many sources would be exhausted in comparatively short periods, even with appropriate conservation measures. In the United States in particular, the rapid exhaustion of the oil lands was regarded as a national question. On Sept. 27, 1909, President Taft, in response to the general demand for conservation, withdrew 3,000,000 acres of public lands in California and Wyoming from "location" under the Placer Mining Law, especially to meet the future needs of the government, of which quite important was the matter of oil fuel for naval vessels. It was also realized that fuel oil was an important asset and necessary for the operation of a fleet with modern engines. To conserve an adequate supply for the future, President Taft on Sept. 2, 1912, created Naval Oil Reserve No. 1, at Elk Hills, Cal, to contain 38,969 acres, and followed it on December 3 of the same year with Reserve No. 2, near Buena Vista Hills, Cal., containing 29,341 acres It was considered desirable that further national oil reserves should be established, and on Apr. 30, 1915, President Wilson created Reserve No. 3, near Casper, Wyo., containing 9481 acres, which then and afterward was popularly known as "Teapot Dome." In the shale oil regions in Utah Reserves No. 4 and No. 5 were established.

After the conclusion of the War the administration of the naval oil reserves was turned over by Secretary of the Navy Denby to Secretary of the Interior A B. Fall in spite of the protest of several naval officers. From this time on, the oil reserves became a matter of considerable interest and figured extensively in political developments in the United States This was due principally to the fact that Secretary Fall leased Naval Reserve No. 3 (Teapot Dome) to H. F. Sinclair, the head of the Sinclair Oil Company, who turned it over to the Mammoth Oil Company in exchange for $106,000,000 worth of stock. This was early in April, 1922, and in April, 1923, the Doheny interests included under the direction of Edward L. Doheny, head of the Mexican Petroleum Corporation, received a preferential right to lease Naval Reserve No. 1 under a contract to perform certain work for the United States Navy at Pearl Harbor, in the Pacific, where a naval base was located and where oil supplies were considered of strategic and practical importance.

Toward the end of the year 1923 the Senate Public Lands Committee engaged in an investigation of the entire subject, which by this time had developed into a considerable scandal, involving former Secretary Fall, who had retired from the cabinet in March, 1923. A subcommittee of the Senate continued the investigation, which brought out considerable sensational testimony but much difference of opinion as to the advisability of making the leases in view of surrounding circumstances. This committee submitted a report which criticized the leases and the part played by several officers of the government, and these leases were canceled and a commission appointed to investigate the en-

tire matter. It was unfortunate that the essential facts were obscured in the political aspect of the situation, and by the middle of 1924 the actual merits of the matter had not been determined outside of the laxity of certain government officials.

During the War there was a great demand for petroleum and petroleum products, but the post-war peace requirements for oil were considerably in excess of the war demands In 1923 the oil wells of the United States produced one-tenth of all the oil hitherto forthcoming in the country up to 1924, and in that year it was estimated by petroleum geologists that the original supply of the United States was more than 40 per cent exhausted.

Bibliography. The frequent reports of the United States Geological Survey and of the United States Bureau of Mines, also the annual issues of *The Mineral Industry*, afford considerable information, particularly on the statistics of the petroleum industry. From time to time the American Petroleum Institute in New York also publishes valuable bulletins and technical papers presented at its annual meetings. A most complete and useful work is *Handbook of the Petroleum Industry*, 2 vols., D T. Day, editor (New York, 1922). Other recent volumes of value are V. R. Garfias, *Petroleum Resources of the World* (New York, 1923); L C Uren, *Petroleum Production Engineering* (New York, 1924); J. M Macfarlane, *Fishes, The Source of Petroleum* (New York, 1923), Dorsey Hager, *Practical Oil Geology* (New York, 1919); id., *Oil Field Practice* (New York, 1921); R. H. Johnson, L. G. Huntley, and R. E Sommers, *The Business of Oil Production* (New York, 1922); J. E. Pogue, *The Economics of Petroleum* (New York, 1921); Victor Ziegler, *Popular Oil Geology*, 2d ed., (New York, 1920); United States Geological Survey, *World Atlas of Commercial Geology*, Part I, *Distribution of Mineral Production* (Washington, 1921); United States Bureau of Standards, *National Standard Petroleum Oil Tables, Circular No 154* (Washington, 1924). See MEXICO, MESOPOTAMIA, CHESTER CONCESSION; SAKHALIN; SHIPBUILDING, *Oil Fuel;* CHEMISTRY, ORGANIC; GEOLOGY.

PETROVA, OLGA (1886–). An actress born in Warsaw, Poland, and educated at Paris, Brussels, and London. She began her theatrical career at the age of 20 in Shakespearean productions and later appeared in plays of Ibsen, Bernstein, and Strindberg. After making her American stage début in New York City in 1911, she gave some time to motion pictures and appeared in *The Daughter of Destiny; The Orchid Lady; Bridges Burned*, and *More Truth than Poetry*, written by herself. She herself wrote *The White Peacock* and *The Hurricane* in which she starred

PETRUNKEVITCH, ALEXANDER (1875–). A Russian-American zoölogist, born at Pliski in Russia, and educated at the University of Moscow and at Freiburg. He was lecturer in zoölogy at Harvard (1903–04); acting professor (1906) at the University of Indiana; honorary curator of arachnida at the American Museum of Natural History (1909–11); and professor of zoölogy (1918–) at Yale. He published· *Gedanken uber Vererbung* (1903), *Free Will* (1905); *Index Catalogue of Spiders of North Central and South America* (1911); *Terrestrial Palæozoic Arachnida of North America* (1913); and *Morphology of Invertebrate Types* (1916).

PETZOLD, JOSEPH (1862–). A German university professor (see VOL. XVIII). He contributed numerous articles to philosophic journals on the physical theory of Einstein as viewed from the standpoint of positive relativism. He also published a volume on *Biologische Grundlagen des Strafenrechts* (1920).

PHASE RULE. See CHEMISTRY, PHYSICAL.

PHELPS, ALBERT CHARLES (1873–) An American architect and educator, born at Lockport, Ill., and educated at the University of Illinois and in Germany. In 1899 he was appointed instructor in the College of Architecture of Cornell University and was successively assistant professor, professor, and World War Memorial Professor of architecture (1920) there. He contributed to architectural journals and lectured at the Metropolitan Museum of Art.

PHILADELPHIA. The third city of the United States. The population rose from 1,549,008 in 1910 to 1,823,779 in 1920 and to 1,922,788 by estimate of the Bureau of the Census for 1923. Much was done between 1914 and 1924 to improve the port. In 1915 the two Southwark piers were completed by the city as the first units of a scheme to give the city a municipally owned water front of more than a mile. The complete development of the plan involved a series of piers, each with a railroad track down the centre connecting with the belt lines on Delaware Avenue, giving access to all the industries along the river. It was expected to cost $24,000,000. The Delaware River was dredged to the sea to a depth of 35 feet. The Navy Department in 1916 began a concrete drydock 1064 by 212 feet, capable of holding any American vessel. During the War the shipyards at Hog Island received orders from the Shipping Board for 120 vessels of 7500 tons and 60 vessels of 8800 tons capacity. Congress appropriated $62,000,000 for the yards, and 50 shipways were laid down and put to work

The municipal government was reorganized in 1920. A small council of 21 members replaced the old bicameral council of 144, the budget system was adopted, model civil service reforms were introduced, including provision for a civil service commission of three persons, and the prohibition of any political activities by firemen or policemen. A city purchasing agent and a city architect were appointed, and radical changes made affecting city contracts.

The city-planning commission submitted a zoning plan dividing the city into residential, commercial, industrial and unrestricted use districts, five height districts, and five area districts. Eleven miles of elevated railroad were built during the ten years, from the Market Street elevated north and northeast, roughly parallel with the course of the Delaware River. It was made to be as noiseless as possible, the steel supports being partly filled with concrete to minimize their vibration, and the rails laid in a roadbed of broken stone. The cars also were specially constructed for silence. In 1918 a $6,000,000 bond issue was voted for a new subway system which was to run north and south under Broad Street, crossing beneath the older subway at City Hall. Before a great deal of work had been done, however, the increasing costs caused by war-time conditions forced postponement of construction. In 1923

it was decided to take up the work once more. Construction was to begin at once on the four track subway under Broad Street from Olney Avenue to Spruce Street, and on the two track subways under Ridge Avenue, Eighth Street, Walnut and Chestnut Streets, and the elevated roadway to the southwest and Darby. The whole work was estimated to cost approximately $90,000,000.

Work was begun in 1921 on a suspension bridge over the Delaware River from Philadelphia to Camden It was to have a central span 1750 feet long, surpassing all previous suspension bridges by 150 feet, and was to be 3536 feet from anchorage to anchorage, and 8126 feet long including the approaches. For a distance of 800 feet the bridge cleared high water by 135 feet. The total cost of the bridge, which was to be borne by the two States of Pennsylvania and New Jersey, and by the two cities of Camden and Philadelphia, was estimated at $22,479,000; and the cost of the real estate which must be bought was $5,392,000. It was hoped to have the work completed by July 4, 1926, when the city planned to celebrate the 150th anniversary of the signing of the Declaration of Independence. A bascule bridge over the Schuylkill was built by the city under the direction of the Bureau of Surveys and opened in 1923. See RAPID TRANSIT.

PHILIPPINES. The largest island group of the Malay archipælago, a possession of the United States since 1899. The population of the Philippines increased from 7,635,426 in 1903 to 10,314,310 in 1918. The estimated population in 1922 was 10,768,323. The population per square mile was 67 in 1903 and 90 in 1918. The population designated as Christian numbered 6,987,686 in 1903 and 9,381,357 in 1918. The non-Christian population, 647,740 and 932,953. The population in 1903 as regards sex included 3,496,652 males and 3,491,034 females, in 1918, there were 5,177,568 males and 5,136,742 females. By races: the brown race numbered 6,914,880 in 1903, 9,386,826 in 1918; the yellow race 42,097 in 1903, 50,826 in 1918; the white race 14,271 in 1903, 12,390 in 1918; the Negro race 1019 in 1903, 7623 in 1918. In 1903, 6,931,548 persons had attained Filipino citizenship and in 1918 this number had increased to 9,428,291. By religions, there were 6,559,998 Roman Catholics in 1903, and 7,790,937 in 1918. The Protestants in 1918 numbered 124,575; the Mohammedans 443,038; Pagans, 508,596; Buddhists, 24,263, and all others, 5454. There are no earlier figures for these last classifications. The largest cities, with their populations, are as follows: Manila, 219,938 in 1903, 285,306 in 1918; Cebu, 31,079 in 1903, 65,502 in 1918; Albay, 14,049 in 1903, 52,756 in 1918; Iloilo, 19,054 in 1903, 49,114 in 1918; Lepa, 37,934 in 1903, 46,577 in 1918; San Carlos, 9974 in 1903, 42,453 in 1918. Other cities having a population of over 35,000 in 1918 are Batangas, Argao, Laoag, Ormuc, and Carcar.

Mineral Production. The islands of the Philippines have important mineral resources. Deposits of gold, coal, petroleum, quicksilver, copper and platinum exist, especially in the department of Mindanao and Sulu. What apparently was one of the largest available unexploited iron deposits in the world is located on the Pacific coast in the Province of Surigao and extends from tidewater to the interior, perhaps to the adjacent province of Agusan. In the decade 1913-23, the Bureau of Science did valuable work in the examination of mineral resources in the islands, and there was a considerable development in mining during that period. In 1915, seven companies were operating mines; this increased in 1918 to eleven; it fell, in 1919 to two, and in 1920 to three. The chief activity during this period was in the examination of oil and coal fields. In 1920, American drillers began boring for oil on the Bondoc peninsula. The production of gold was 1,937,941 fine grams in 1918; 1,970,651 in 1919; 1,920,753 in 1920; and 1,976,096 in 1921. The silver production was 128,974 fine grams in 1918; 261,558 in 1919; 307,343 in 1920; and 814,621 in 1921. These are the only metallic metals of importance mined in the islands. Of the non-metallic, the chief products are coal, lime, mineral waters, salt, sand and gravel, and stone. The coal production in 1918 was 15,663 metric tons; in 1919, 32,892; in 1920, 58,088, and in 1921, 39,445. The production of lime in 1918 was 15,000 metric tons; in 1919, 20,000; in 1920, 3000; and in 1921, 3500. The total value of mineral products in 1918 was 3,915,095 pesos; in 1919, 4,622,241; in 1920, 5,126,711; and in 1921, 3,520,520.

Agriculture. In the decade 1913-23, as in the previous years of American administration, vigorous and unremitting efforts were made to encourage and extend agriculture, which is the principal source of welfare of the islands and the chief occupation of the people. The results accomplished were nothing short of remarkable. They were brought about by improving communications on land and sea; lowering freight rates; furnishing expert professional advice; encouraging the building up of agricultural schools; urging the youths of the country to devote themselves to agriculture; by continued efforts to eradicate epidemic diseases among horses, cattle and carabaos; by vigorous campaigns against locusts; by the enactment of health legislation, and in various other ways. During the decade the Department of Agriculture also encouraged the raising of poultry and the breeding of hogs, cattle and other animals with a view to increasing the food supply. It encourages the breeding of carabaos, cattle and horses for work purposes. Under the supervision of the Bureau a very careful study was made, with a view to prevention and control of rinder pest, a disease which every year carries off many thousands of carabaos. Rigorous regulations were applied against the importation of cattle from countries affected with rinder pest and other cattle diseases and a rigid quarantine was constantly maintained. The agricultural crops are often affected by drought and other disadvantageous conditions. Following the successful rice crop of 1913, the crop of 1914 was damaged by a great drought, which resulted in a decrease of 25 per cent in the production The substitution of corn as a food product made considerable headway during the decade. The crop for 1914 was 6,265,746 cabans, an increase of 44 per cent over the preceding year. The production of corn was 309,799 metric tons in 1918; 332,636 in 1919; 431,268 in 1920; 402,714 in 1921; and 375,362 in 1922. The most important crop in the islands is rice. The area under cultivation increased from 1,244,937 hectares in 1914 to 1,661,430 hectares in 1922. The production increased from 977,682,959 kilos in 1914 to 1,124,000,000 kilos in 1922. The value of

the product increased from 57,261,760 pesos in 1914 to 139,935,080 pesos in 1922. Second in point of value of the product is sugar cane. The area cultivated increased from 169,436 hectares in 1914 to 240,820 hectares in 1922. The value of the sugar cane increased from 28,631,545 pesos in 1914 to 59,948,250 pesos in 1922. Third in importance is coconuts: the production increased from 591,266,399 nuts in 1914 to 1,407,684,000 in 1922, while the value increased from 25,651,764 pesos in 1921 to 55,267,680 in 1922 The production of abaca, or manila hemp, which is an important industry, decreased from 137,635,563 kilos, valued at 29,968,009 pesos in 1914 to 121,046,019, valued at 19,918,860, in 1922. The tobacco industry showed a decrease also; in 1914, there were produced 46,731,463 kilos valued at 7,109,367 pesos, and in 1922, 29,927,000 kilos valued at 6,019,870 pesos. The production of coffee, on the other hand, increased during the decade. The production in 1914 was 626,408 kilos valued at 302,771 pesos, which increased to 1,149,000 valued at 822,800. The production of cacao increased from 565,802 kilos in 1914 with a value of 354,057 pesos, to 984,000 kilos with a value of 1,148,100 pesos in 1922 The total area of land cultivated under the nine principal crops in 1917 was 2,721,182 hectares, out of a total area of 29,625,974 hectares. This had increased in 1919 to 3,005,322 hectares. The total area of cultivated farms increased from 1,298,845 hectares in 1903 to 2,415,778 hectares in 1918. The total area of farms, including cultivated and uncultivated, increased from 2,827,704 hectares in 1903 to 4,563,723 in 1918. The average size of the cultivated farms decreased from 159.3 hectares in 1903 to 123.6 in 1918.

The progress of the live stock industry in the islands is indicated by the statistics in the

	1913	1916	1918	1920
Cattle	418,114	567,456	601,297	760,920
Carabaos .	1,047,164	1,228,836	1,338,082	1,464,285
Horses and mules .	179,089	203,364	234,041	268,999
Goats	529,180	661,859	751,077	821,661
Sheep	104,147	142,091	165,686	195,705
Hogs	2,086,736	2,734,803	2,894,403	3,369,183

table. It may be noted that in 1916 the cattle and carabaos killed by rinder pest numbered 18,251, in 1918, 15,747, in 1920, 16,911 and in 1922, 34,306 In spite of the difficulties encountered, gratifying progress was made in the production of crops in the Philippines, especially in the last three years of the decade. In 1920 there was a production far in advance of any previous annual period. In 1917 the aggregate value of six leading crops was 241,000,000 pesos; in 1918 it advanced to 350,000,000 pesos; in 1919 to 458,000,000 pesos and in 1920 to 687,000,000. While much of this increase in the money value was due to prevailing high prices, there was an increase in the acreage under cultivation and in the yield. In 1920, less rice was imported than in the previous year and the production came nearest to meeting the demand for home consumption Corn also showed an increase in acreage and in value. The veterinary division of the Department of Agriculture and Natural Resources performs valuable services by inoculating cattle against rinder pest with an anti-rinder pest serum. During 1920, over 10,000 animals were immunized by inoculation. Several experiment stations are maintained in the islands as well as breeding stations for horses, cattle, swine and poultry. The Plant Industry Division exercises supervision over plant and seed selection, tests fertilizers and conducts exploration and investigation into various subjects connected with plant industry. In 1922, 12 stations and 17 projects were maintained.

Manufactures. While the manufacturing development in the Philippines has not kept pace with agricultural and commercial development, there has been considerable progress, as is indicated by the fact that the number of establishments increased from 3259 in 1903 to 8354 in 1918; wage earners increased in number from 79,906 in 1903 to 143,465 in 1918; capital invested increased from 53,159,580 pesos in 1903 to 22,473,592 in 1918; and value of the products increased from 41,700,215 pesos in 1903 to 356,094,433 in 1918, while the value added by manufacture increased from 16,650,763 pesos in 1903 to 195,217,279 in 1918. The manufacture of sugar is the most important industry. Its rapid development may be shown by the fact that the value of the product in 1903 was 6,603,006 pesos and in 1918, 82,145,962 pesos. Oil works rank second in value of product, and had a remarkably rapid development, increasing from a value of 302,032 pesos in 1903 to 59,722,483 in 1918. Rice mills increased the value of their product from 1,010,965 pesos in 1903 to 43,462,805 in 1918 · The abaca or hemp-pressing industry is also important; the value of the products in 1918 were 44,844,566 pesos. There were no comparative figures for 1903 as this industry had not then developed. The product of cigar and cigarette factories increased from 8,740,516 pesos in 1903 to 26,623,275 in 1918. Other important industries are lumber mills, rope factories, tailor shops, boatbuilding, lithography, printing and bookbinding. The manufacture of coconut oil and copra is of great increasing importance. In 1922, there were produced 366,808,888 kilos of copra and 2,656,813 kilos of coconut oil.

Transportation. The length of the railway lines in the islands increased in the island of Luzon, from 883 60 kilometers in 1913 to 1,039.14 in 1922. In Cebu and Panay the mileage remained stationary at 212 kilometers in the two periods. The total passenger and freight revenue in the lines of Luzon, which includes the city of Manila, increased from 4,878,767 pesos in 1913 to 11,033,400 in 1922. In the city of Manila, there were about 80 miles of electric railways which carried over 36,000,000 persons annually. The number of automobiles in the islands increased greatly; in 1922 there were about 10,000, and nearly 3000 automobile trucks. The mileage of telephone wire increased from 9123 kilometers in 1918 to 10,360 in 1922. There were, in 1922, about 36,000 kilometers of telephone wire.

Education. The development of education in the islands has been one of the chief concerns of the government since the establishment of American rule, and the efforts have been extraordinarily successful. From the establishment of the Bureau of Education in 1900, a great public school system has been developed in the islands. This achievement has been made possible only through persistent struggles against adverse conditions. Buildings and equipment had to be renewed and teachers had to be trained. The people in general had to be

educated to appreciate the value of the public schools and their interest in them and their readiness to support them is in distinct contrast to the apathy which existed at the time the system was founded. Their change of attitude is an indication of an intellectual awakening which scarcely finds a parallel in history. At the time the Bureau was established, there were over 1,000,000 children of school age in the islands and it was the aim of the bureau to bring 800,000 of these into the public schools at the earliest possible date. In 1913–14, the annual enrollment for the school year was 621,000. This had increased in 1921–22 to 1,077,342. The average monthly enrollment in the latter year was 975,092, and the average daily attendance was 909,947. The problem of teachers was a very serious one; at first a large portion of the instructors in the schools were American, but the training of Filipino teachers at the Philippine Normal School, the Philippine School of Arts and Trades, the provincial secondary schools, the intermediate schools, and the University of the Philippines resulted in a large proportion of well-trained native teachers. The number of male American teachers decreased from 268 in 1917–18 to 134 in 1921–22, while the male Filipino teachers increased from 8421 to 14,417. The number of female American teachers increased from 138 in 1917–18 to 231 in 1921–22; Filipino female teachers in 1917–18 numbered 4400 and 9253 in 1921–22.

Special forms of education, such as physical, agricultural and industrial instruction were successful from the beginning. In 1920, there were over 250 agricultural schools; 15 of these were classed as agricultural schools, 14 as farm schools and 222 as settlement farm schools. The famous Central Luzon Agricultural School at Munoz is said to be the best institution of its kind in the Orient. Improvement in the quality and quantity of the industrial work done in the public schools was steady. In 1919–20, the school children produced industrial articles worth over 1,300,000 pesos. Records attained by students of the public schools of the Philippines in the carnival interscholastic games and Far Eastern meets show conclusively that physical education also was receiving the closest attention. Instruction in civics, hygiene and sanitation is given in the first six grades of the public schools. The spread of education among the non-Christian tribes has been a difficult problem. The purpose of the Bureau of Education has been to bring these people to the same cultural level of their Christian brethren and at the same time to strengthen the bond of union between them and their Christian kinsmen. To bring about this result, a large number of Christian Filipino teachers were assigned during the decade 1913–23 to these provinces. In 1920, there were 1728 of these teachers. In addition to the public schools there were many private schools in the island. These, in 1921–22, numbered 525, with a total enrollment of 64,835, over double the enrollment of 1913. The total expenditures for public schools in 1922 was 16,382,348 pesos, compared with 6,262,778 pesos in 1913. In 1921–22, there were in the islands 371 public vocational schools. Of these 338 were schools of agriculture; 23 were trade schools and 7 were normal schools. The University of the Philippines at Manila steadily increased in influence and importance. It is composed of the Colleges of Agriculture, Education, Engineering, Liberal Arts, Law, Medicine and Surgery, Veterinary Science, Junior College of Liberal Arts, and Schools of Dentistry and Pharmacy. Also connected with the university is the Conservatory of Music, School of Fine Arts, School of Forestry, School of Nursing, and University High School. The total attendance in 1921–22 was 4063 compared with an enrollment of 1398 in 1913.

Finance. Financial conditions in the islands suffered in the decade 1913–23 from the disturbances created in general by the War and also by local conditions. The Philippine National Bank, the largest financial institution in the island (see *Banking*, below), suffered during 1920 as a result of an extension of its loans for the development of the industrial and commercial resources of the islands. This had an unfavorable result on the finances of the Territory. The general progress of financial administration during the decade will be noted from the fact that the receipts for the fiscal year 1913 amounted to 26,979,400.64 pesos and the expenditures to 29,608,082.54 pesos. In 1920, the receipts amounted to 90,905,779.72 pesos and the expenditures to 75,511,145.73 pesos. There was a surplus at the end of the year of 15,394,633.99 pesos. In 1922, the receipts of the insular government amounted to 130,649,853 and the expenditures to 78,911,424, leaving a surplus of 51,738,430 pesos. The bonded indebtedness of the islands in 1913 was 32,250,000 pesos, and in 1922 was 149,420,000 pesos.

Trade and Commerce. The development of trade and commerce in the islands during the decade 1913–23 is shown by a comparison of figures for several years of the decade. The total foreign trade in 1913 amounted to 202,171,484 pesos, of which 106,625,572 were imports and 95,545,912 exports. The total trade had increased by 1918 to 467,587,387 pesos, of which 270,388,964 were exports and 197,198,423 imports. In 1920, the total trade exceeded 600,000,000 pesos, but owing to adverse conditions in the two years following, it fell, in 1922, to 351,561,885 pesos, of which 191,166,526 were exports and 160,395,289 were imports. The total trade of the United States in 1922 amounted to 223,699,852 pesos, compared with 86,220,558 in 1913. The exports in 1922 to the United States amounted to 128,223,201 pesos and the imports from the United States to 95,476,651 pesos. The most important articles exported from the islands are copra, sugar, hemp, tobacco and oils. The leading articles imported are cotton and its manufactures, agricultural implements, iron and steel, and oils. The domestic commerce in 1922 amounted to 981,782,066 pesos, compared with 661,640,304 pesos in 1914.

Health and Sanitation. Perhaps the greatest problem faced by the American government in the Philippines was the spreading of ideas of modern sanitation among the people. For the most part the average Filipino is born, lives and dies without medical attendance or nursing. There is also great lack of hospitals and dispensaries. Although great progress was made in sanitation during the decade 1913–23, especially during the first years of the period, there was a steady increase in recent years in the number of preventable diseases, especially typhoid, malaria, beri-beri, and tuberculosis. Epidemics of cholera and other diseases were frequent. The death rate per 1000 in the is-

lands was 16.817 in 1913; 18.553 in 1914; 35.467 in 1918; 19.385 in 1921. As a result of intensive general vaccination, smallpox almost entirely disappeared from the islands. Cholera, however, continued more or less prevalent. There was an outbreak of considerable intensity in 1916. Typhoid fever caused many deaths, and systematic anti-typhoid vaccination carried on by the health service contributed much to the gradual diminution of this disease. An active educational campaign was carried on through the decade by public conferences, lectures, administrations, pamphlets and other measures. Leprosy, which is common in the islands, was greatly reduced by the administration of various esters of chaulmoogra. A leper colony is maintained at Culion, where about 500 persons receive this treatment annually. Much excellent work was done by missionary societies during the decade in the establishment of hospitals and dispensaries The Rockefeller Foundation also contributed money and personnel with excellent results. A school for sanitary inspectors was conducted, which included a six months' intensive training course for the nurses

Banking. The resources of the banks in the Philippines increased from 63,745,929 pesos in 1913 to 431,405,077 in 1920. In 1922, they amounted to 326,203,461 pesos. The Filipino National Bank was established in 1916 and by law was made the depository of all provincial and municipal governments All government funds were transferred from other banks to this bank. As the result of inefficient management, the bank suffered a series of losses in 1920 which reached a total of $22,500,000 The American government, becoming alarmed at the situation, secured the services of an experienced banker from the United States under whose guidance the bank was placed on a sounder footing A large part of the assets, however, had been loaned to concerns which for many years will be unable to repay them. These were chiefly sugar centrals and coconut-oil factories. The bank also established branches and agencies throughout the islands in charge of which were placed untrained Filipinos, and these branches, without exception, were mismanaged. These losses seriously involved the Philippine government and its credit was severely impaired by the fact that it was not able to meet its obligations.

Government. The insular government is divided into the legislative, executive and judicial branches. At the head of the executive branch, since the passage of the Organic Act of 1916, is the governor-general, who is appointed by the President, by and with the advice and consent of the Senate. He is assisted in the performance of his duties by the department secretaries. All these, with the exception of the secretary of public instruction, who is also vice governor-general and is appointed by the President, were Filipinos in 1924. These officers are appointed by the governor-general. The other officials of the government, appointed by the President, are the auditor, and the deputy auditor, and the nine justices of the Supreme Court. As regards provincial government, the Philippines are divided into 48 provinces, 36 of which are known as regularly organized provinces and the remaining 12 as specially organized provinces. The chief executive of a province is the provincial governor, who in a regularly organized province is an elected official. He, together with the other two elected members, forms the provincial board which constitutes the legislative branch of the provincial government. In some of the specially organized provinces, the provincial governors are elected and any other appointive officials There are in the Philippines 890 municipalities The executive of a municipality is called a municipal president. The municipal council, which is the legislative branch of the municipal government, consists of from 8 to 19 councilors, depending on the size of the municipality. The Legislature is made up of the Senate and the House of Representatives. Of the 24 senators only two are appointed by the governor-general. All the others are elected by popular vote. The 93 representatives are also elected, with the exception of nine, who are appointed.

Judiciary. The administration of justice is entrusted to the Supreme Court, in the courts of first instance, the municipal court of the city of Manila, and the courts of justices of the peace. The Supreme Court is made up of nine justices, one of whom is chief justice. Decisions of the Supreme Court may be appealed to the United States Supreme Court in certain cases.

Political Events. The decade 1913–23 included some of the most important events since the American occupation. It was marked by the passage by Congress, in 1916, of an Organic Act which established the form of government for the islands. From 1913 to 1916, the period was marked by political changes which had a marked influence on the later political history of the Territory. From 1907 to 1913, under the influence of the Philippine Commission, many constructive measures were passed and special emphasis was placed upon the improvement of education and the construction of permanent improvements From 1913 to 1916, the restraining influence of the Commission was withdrawn by the appointment of a majority of Filipinos in that body.

In September, 1913, Francis Burton Harrison was appointed Governor-General of the Islands of the Philippines, succeeding W. Cameron Forbes. In conformity with his previously announced policy, President Wilson nominated a majority of the Filipinos as members of the Commission. Since the membership of the lower house of the Philippine Assembly was already composed entirely of elected Filipinos, this placed the majority vote of the Filipino legislation in the hands of the Filipino people. The Legislature in 1914 passed many important measures, especially relating to finances. Governor Harrison carried on the policies of the Federal administration by appointment of an increasing number of Filipino heads of the executive branches of the government. During 1914 there occurred the so-called Ricarte movement A man of this name, from a refuge in Hongkong, attempted to create an uprising among the more ignorant classes of persons in Manila and elsewhere This was quelled without serious trouble. In 1915, the greater part of the legislative sessions was devoted to consideration of financial reform and the economic development of the islands. During this year there were practically no disturbances requiring the attention of the constabulary in any part of the islands. The year 1916 was signalized by

the passage in Congress of a new Organic Act which was approved by President Wilson on Aug. 29, 1916, and which did away with the Philippine Commission and established a governor-general as the executive head. It established the executive, legislative and judiciary departments as described in the paragraph *Government* above.

The first session of the Philippine Legislature created by the bill convened in Manila on Oct. 16, 1916. For the first time in the history of the islands, the non-Christian tribes were represented in the legislative branch of the government.

Congress, in 1917, passed no measures directly affecting the Philippines. The Immigration Act passed in that year applied to the islands but only until superseded by an act of the Philippine Legislature on the subject. The first election for senators in the Philippines was held in October, 1916, and at the meeting of the Legislature on October 16 of that year, the Philippine Commission ceased to exist. The session of the Legislature held in 1917 created a new budget system which was approved by the President. A currency act provided for the reduction of the bullion value of Philippine coins when circumstances required, and made other provisions in relation to the currency.

The year 1919 was one of political activity and economic disturbance in the islands, as a result of conditions brought about by the end of the War. The statements of the Allied leaders during and after the War in regard to the rights and liberties of small nationalities had been widespread in the Philippines and led to a demand on the part of a strong political element for immediate independence. Immediately after the signing of the Armistice, the Filipino Legislature appointed a commission to the United States ostensibly for the purpose of establishing improved economic relations, but before its departure for the United States the commission was instructed to present the case for immediate independence. The agitation for independence, while it continued in 1920, was less strenuously advocated. By 1920, all the branches of the government, except the Supreme Court, had been Filipinized. Following the election of President Harding in 1921, Governor-General Harrison resigned and was succeeded on October 15 of that year by General Leonard Wood, who, with W. Cameron Forbes, formerly governor-general, had been appointed as a special commissioner to the Philippines to examine the political and economic conditions. The Commission arrived in Manila on May 4, 1921, and at once undertook a general survey into the government and conditions of the islands. Following General Wood's service as chairman of the Commission, he was appointed, in October, 1921, governor-general of the islands. General Wood and Mr. Forbes, in their report on the work of the Commission, recommended that the present general status of the Philippines continue until the people have had time to absorb and thoroughly master the power already in their hands. They recommended also that the governor-general have authority commensurate with the responsibilities of his position. The report concluded as follows: "We recommend that under no circumstances should the American government permit to be established in the Philippine Islands a situation which will leave the United States in a position of responsibility without authority."

At the very outset of his administration, Governor Wood found himself bitterly opposed by the aggressive advocates of independence. Controversy over appointments and other details of administration in 1922 resulted in a demand on the part of political leaders for Governor Wood's recall. He was, however, upheld in all his acts by President Harding. The Legislature of 1921 and 1922 provided for the issuance of bonds in the amount of $5,000,000 for the purpose of protecting the financial interests of the government. Two parties, the Collectivista or coalition party, headed by Manuel Quezon and Señor Osmena, the two most powerful politicians in the islands, and the so-called Democratic party, were the most important political organizations in the islands. The Collectivistas carried on, from 1921 to 1924, an aggressive campaign for independence and against the administration of General Wood. The Democratic party took the more moderate position. While it stood for independence, it assailed the leaders of the other party as grossly corrupt and charged them with misapplication of funds. In February, 1923, the Legislature chose Isauro Gabaldon and Pedro Guevara resident commissioners in Washington. The Collectivistas refused to coöperate with Governor-General Wood in the work of the legislation. The Philippine Independence Commission, in November, 1923, appointed Manuel Roxas speaker of the Insular House of Representatives, commissioner to visit Washington and explain the Filipino side in the controversies with the governor-general. A resolution was introduced in Congress, in December, for an investigation of the administration of General Wood in the Philippines. The resolution failed of passage. The Filipino Independence Commission, in January, 1924, presented to Congress a memorial denouncing the administration of General Wood and asking for the immediate independence of the islands. In March, 1924, Señor Roxas presented the arguments for independence to President Coolidge, who replied in a letter reviewing the Philippine situation and declaring that "Although they have made wonderful advances in the last quarter of a century, the Filipino people are by no means equipped, either in wealth or experience, to undertake the heavy burden which would be imposed upon them with political independence. Their position in the world is such that without American protection there would be the unrestricted temptation to maintain a costly diplomatic service and an ineffective but costly military and naval service." He said also "The Government of the United States has full confidence in the ability, good intentions, fairness and sincerity of the present Governor-General. It is convinced that he has intended to act, and has acted within the scope of his proper and constitutional authority." The Insular Affairs Committee of the House of Representatives, in March, 1924, voted the report granting independence to the islands. This was afterwards modified to provide for such independence in 25 years. No action was taken on this resolution prior to the adjournment of Congress in June, 1924.

PHILLIPS, CHARLES (1880–). An American poet and playwright, born at New Richmond, Wis., and educated there and in

Toronto. He had much experience as an editor, and during the War served overseas. Among his best books are: *Back Home—An Old-Fashioned Poem* (5th ed., 1913); *The Divine Friend*, a poetic drama produced by Margaret Anglin in 1915; *Tarcisius*, a drama (1917); *A Buccaneer of Christ* (1918); *A Saint for Soldiers* (1918); *The New Poland* (London, 1923); *The Teachers' Year* (1924).

PHILLIPS, WILLIAM (1878–). An American diplomat, born at Beverley, Mass., and educated at Johns Hopkins University and the Harvard Law School He was private secretary to the Ambassador to Great Britain from 1903 to 1905 and served in various capacities in the State Department until 1908. He was appointed chief of the division of Far Eastern affairs and then became First Secretary of the American Embassy in London. He served again in the State Department and from 1917 to 1920 was Assistant Secretary of State. From the latter year to 1922 he was minister to the Netherlands and was appointed Under-Secretary of State in 1922. In 1924 he was appointed Minister to Belgium.

PHILOLOGY, CLASSICAL. The 10 years dating from Aug. 1, 1914, were trying years for one who sought to survey the wide field of classical philology. The War in Europe, 1914–18, interrupted the publication of periodicals and books, especially the former Even in 1924, conditions in the book trade abroad were still unbalanced. It was hard to find out what was being published abroad, and still harder to obtain copies of books.

Inevitably, therefore, in the present article the major emphasis is laid on the work of American classical scholars. Further, it is possible only to discuss certain marked movements and tendencies, and to name a few of the more important books. The books named will be, for the most part, selections from the extensive lists given in the *New International Year Books* 1914–23.

In *The Nation* (New York), May 11, 1911, Prof. Paul Shorey, of the University of Chicago, in a paper entitled "American Scholarship" (reprinted in *The Classical Weekly*, vol. iv., pp. 226–230), supplied adequate proof that American classical scholarship need not fear comparison with the classical scholarship of Germany, or England. At the semicentennial of the American Philological Association, in December, 1919, Professor Shorey returned to the subject, in a paper entitled "Fifty Years of Classical Studies in America." At the same meeting, Prof. F. G. Moore, of Columbia University, traced the history of the American Philological Association, and Prof. M. Bloomfield, of the Johns Hopkins University, considered "Fifty Years of Comparative Philology in America." For these three papers see *Transactions of the American Philological Association* (vol. 1, pp. 5–83).

In the decade, American classical scholarship suffered grievous losses through the deaths of the following scholars (the name of the university with which the scholar was connected at the zenith of his career is given in parenthesis): Frank Frost Abbott (Princeton), Charles E. Bennett (Cornell), John M. Burnam (Cincinnati), Basil Lanneau Gildersleeve (Johns Hopkins), Thomas D. Goodell (Yale), Tracy Peck (Yale), Bernadotte Perrin (Yale), Samuel Ball Platner (Western Reserve), Moses S. Slaughter (Wisconsin), Kirby Flower Smith (Johns Hopkins), James Rignall Wheeler (Columbia), and John Williams White (Harvard).

Professor Gildersleeve, whose death occurred on Jan. 9, 1924, was for 40 years editor of the *American Journal of Philology*. In the *Year Book* for 1921, p. 553, reference was made to the fact that vol. xl, No. 4, of that journal appeared on Oct. 3, 1921, the ninetieth anniversary of the birth of Professor Gildersleeve, and that the whole volume was dedicated to him. The number mentioned contains an "Index Scoliodromicus," of 13 pages, which lists Professor Gildersleeve's extrasyntactical contributions to the *American Journal of Philology*, and supplements the "Indiculus Syntacticus," published in the same periodical (vol. xxxvi, 1917), a bibliography of Professor Gildersleeve's long array of very valuable notes, published in the *American Journal of Philology*, in the sphere of syntax.

One of the most interesting developments during the decade was to be seen in the efforts made, especially in England, America, and Germany, to bring a knowledge of the contents of the classical authors, and of their value, to a wider array of readers. Of prime importance here is the Loeb Classical Library, whose aim is to present all the more important classical authors, Greek and Latin, with the ancient text on one page and an English translation on the opposite page. For general observations on the Library see *The Classical Weekly* (vol. v, pp. 126–127; vol. vi, pp 82–86, 127); for detailed discussions (by C. Knapp) of various volumes of the Library see *The Classical Weekly* (vol. vii, p. 192; vol. xii, pp. 49–50, 57–58, 65–66; vol xiii, pp. 145–147, 153–154, 161–162, 169–170; vol. xv, pp. 187–190, 197–199; vol. xvi, pp. 185–186, 193–195; vol. xvii, pp. 169–170, 177–178, 185–186.

Another important movement in this field is represented by the series of volumes entitled *Our Debt to Greece and Rome*, published under the general editorship of Prof. G. D. Hadzsits, of the University of Pennsylvania, and Prof. D. M. Robinson, of The Johns Hopkins University. For the plan and the scope of the series, see the *New International Year Books* for 1922 and 1923.

In Germany, the series of volumes whose purpose is to popularize the classics is entitled *Das Erbe der Alten*. More pronouncedly scholarly, but still of interest to the general reader, are such works as *Einleitung in die Altertumswissenschaft*, under the general editorship of A. Gercke and E Norden; *Die Hellenische Kultur*, and *Die Hellenistische-Romische Kultur*, both edited by F. Baumgarten, F. Poland, and R. Wagner and *Die Griechische und Lateinische Literatur und Sprache*.

A very important work in classical philology in the decade was the establishment of two new series of classical texts. Germany had long had an authoritative series of texts of the classical authors, both Greek and Latin—the famous Teubner Series. By 1924, the Oxford University Press had, in the course of 30 years, in the Oxford Classical Text Series, presented a fair array of texts of authors. Greek and Latin, edited by competent scholars, in most cases English. During the War, Messrs. Paravia and Company, Italian publishers, began a series entitled *Corpus Scriptorum Classicorum Paravianum* (see *The Classical Weekly*, vol. xi,

p. 200, xv, 135–136; *Year Book* for 1918, p. 493). The *Corpus Paravianum* was to show the manuscript text, with emendation only where the manuscript tradition gives no sense; otherwise, conjectural alterations proposed or accepted in other editions were not even to be mentioned.

About 1917 or 1918, French scholars began the publication of a series of texts of authors, Greek and Latin, under the patronage of the Association Guillaume Budé, which derives its name from Guillaume Budé, the great humanist of the French Renaissance, the founder of the Collège de France. In each instance, the text, with a brief critical apparatus, and a translation, in French, were to be given. There were published editions (with translations) of parts of Plato, Æschylus, Sophocles, Pindar, Aristotle, Aristophanes, Cicero, Seneca, Tacitus, as well as complete editions of Lucretius, Persius, Juvenal, Catullus, and Petronius. Under the head of literary and historical studies, the Association published also a *Histoire de la Littérature Latine Chrétienne*, by P. De Labriolle, and of *Sénèque Prosateur, Etudes Littéraires et Grammaticales sur la Prose de Sénèque le Philosophe*, M A. Bourgery.

In Germany certain monumental works had long been under way, before 1914, whose aim was to make accessible what was known (or conjectured) in various fields of classical philology. The most ambitious efforts of this sort were the *Handbuch der Classischen Altertumswissenschaft*, and the classical encyclopædia known by the abbreviation "Pauly-Wissowa"

The *Handbuch* was begun under the editorship of Iwan von Müller. After 1922, a thorough revision, under the direction of W. Otto, in progress In the 50 years that had elapsed from the time the publication of the *Handbuch* was begun, the horizon of the classical scholar had been greatly widened, particularly through the discoveries connected with the so-called Minoan civilization. This extension of knowledge took scholars back several millenia of the point at which, five or six decades previously, classical civilization was supposed to begin. Scholars had gained, also, a far better understanding of the relation of the historic classical civilization to the civilization that preceded it, in the Mediterranean Basin, on the European side, in Egypt, and in Asia. Hence, in the revision of the *Handbuch* new topics were being included, such as "Grundriss der Politischen Geschichte des Alten Orients," and "Kulturgeschichte des Alten Orients," to each of which a volume was to be devoted. The title of the *Handbuch*, in view of this wider range of its subjects, was altered to *Handbuch der Altertumswissenschaft*.

Pauly's *Real-Encyclopädie der Klassichen Altertumswissenschaft* was begun as long ago as 1830. A revision was undertaken, in 1890, by G. Wissowa; the first part of this appeared in 1894. The work, in 1924, was under the direction of W. Kroll and W. Witte. Between 1913 and 1924, four enormous volumes, carrying the first part of the encyclopædia forward from "Helikon" to "Kynegoi," were published. To facilitate the progress of the work, what was called a "Zweite Reihe" was begun in 1920. Two volumes of this, covering the articles "Ra" to "Sila," had been issued (1920, 1921). In 1918 appeared also *Supplementband III*, dealing with "Aachen" to "Ad Iuglandem"; *Supplementband IV* was issued in 1924.

Another great German undertaking, *Ausführliches Lexikon der Griechischen und Römischen Mythologie*, begun by W. H. Roscher, with the coöperation of many scholars, was virtually complete. The great *Thesaurus Linguae Latinae*, the most comprehensive and authoritative of all Latin lexicons, made some progress during the decade. In France, the Great *Dictionnaire des Antiquités Grecques et Romaines*, by Daremberg and Saglio, was completed during the decade.

A significant movement in the United States was the attention paid to the classical element in English literature. Important studies here were *The Relation of Latin and English as Living Languages in England During the Age of Milton*, W. P. Myers; *The Influence of Horace on the Chief English Poets of the Nineteenth Century*, Mary R. Thayer; *Horace in the English Literature of the Eighteenth Century*, Caroline Goad; *Vergil and the English Poets*, Elizabeth Nitchie; *The Classical Mythology in Milton's English Poems*, C. G. Osgood; *Classical Mythology in Shakespeare*, R. K. Root; *Ovid and the Renascence in Spain*, R Schevill (1913); *The Traditions of European Literature from Homer to Dante*, Barrett Wendell. For discussions of these works, see *The Classical Weekly* (vol. xii, pp. 171–173, 177–179, 185–188; vol. xiv, pp. 25–29; vol. xvi, pp 13–16).

During the 10 years, increasing attention was paid to the papyri discovered from time to time, especially in Egypt. These were studied in part for the light they throw on works of classical writers already known, by giving recensions of the ancient text hundreds of years older, in some instances, than the earliest manuscripts. They were examined also for additions to the store of classical texts. Illustrations of the profits of such study are to be seen, for example, in the volumes of *Oxyrhynchus Papyri*, edited by the English scholars, Messrs. Grenfell and Hunt (see, for instance, *The Classical Weekly*, vol. xiv, pp. 14–16; *The Classical Review*, vol. xxxiv, pp. 67, 179; *The South Atlantic Quarterly*, April, 1914), and in such a book as *New Chapters in the History of Greek Literature, Recent Discoveries in Greek Poetry and Prose in the Fourth and Following Centuries B.C*, by J. U. Powell and E. A. Barber (1921). A striking illustration of the value of the papyri in yet a third field, the study of Greek life and Roman life, is afforded by an important volume, "A Large Estate in Egypt in the Third Century B.C., A Study in Economic History," by M Rostovtzeff, published as *University of Wisconsin Studies in the Social Sciences and History, No. 6* (1922). The author undertook to assemble into a complete picture the 350 papyri, or more, that give the correspondence of a Carian Greek named Zenon, manager of a great estate of land, originally unimproved, which Ptolemy II (Philadelphus) turned over to his Treasurer of Finance, a Greek named Apollonius. For a review of this book by Prof. W. L. Westermann, of Columbia University, see *The Classical Weekly*, vol. xvi, pp. 110–112.

Towards the end of the decade, through efforts organized by Prof. F. W. Kelsey, of the University of Michigan, various American universities had come into possession of papyrus documents. These were being studied by va-

rious scholars. In the *Transactions of the American Philological Association*, vol. liii (1922), Prof. J. G. Winter, of the University of Michigan, discussed "Some Literary Papyri in the University of Michigan Collection." Prof. C. Bonner, of the same university, discussed "A Papyrus of Dioscurides in the University of Michigan Collection." This gives part of a work entitled *De Materia Medica*, by Dioscurides of Anazarba. At the meeting of the American Philological Association at which these two papers were read, Prof. A. G. Laird, of the University of Wisconsin, presented a paper on "The Wisconsin Papyri," and Prof. A. E. R. Boak, of the University of Michigan, discussed "The Record Office of Tebtunis and Cersesuchon Oros." The last named paper dealt with a register of contracts for a period of four months, Apr. 28 to Aug. 28, 42 A.D.

Just before the beginning of the decade under review, Prof. B. W. Bacon, of Yale University, writing in *The Classical Weekly* (vol. vi, pp. 213–214), declared that "Until very recently no manuscripts of first-rate critical importance had come into American hands." Later, however, classical manuscripts of importance found a resting place in the Morgan Library in New York City. One of these, a fragment of a manuscript of Pliny's *Letters*, was decidedly in evidence in 1924. It had been bought by the late J. Pierpont Morgan in 1910. Dr. E. A. Lowe, a leading authority on classical palæography, and Prof. E. K. Rand, of Harvard University, published the fragment, in 1922, in a sumptuous monograph, well illustrated by plates, entitled *A Sixth-Century Fragment of the Letters of Pliny the Younger, A Study of Six Leaves of the Uncial Manuscript Preserved in the Pierpont Morgan Library in New York*. Dr. Lowe believes that the fragment is a genuine relic of antiquity, and that it was written in Italy, about 500. Professor Rand believes that it is a part of a codex used by Aldus Manutius, in the preparation of his printed edition of Pliny's *Letters*. This codex, the Codex Parisinus, is now lost. In his views of the fragment, and of Aldus's edition of Pliny, Professor Rand is in sharp collision with Prof. E. T. Merrill, of the University of Chicago, who, in 1922, published a critical edition of the text of Pliny's Letters. For reviews of the monograph by Messrs. Lowe and Rand see *The Classical Journal*, vol. xviii, pp 381–382; *Philologische Wochenschrift*, vol. xliii, pp 509–511; *American Journal of Philology*, vol. xlv, pp. 88–90; and *The Classical Review*, vol. xxxvii, pp. 139–140. Professor Merrill, in a paper entitled "The Morgan Fragment of Pliny's Letters," in *Classical Philology*, vol xviii, pp 97–119, takes issue with the views of Professor Rand. Professor Rand began an elaborate reply, in a paper entitled "A New Approach to the Text of Pliny's Letters, Article I," published in *Harvard Studies in Classical Philology*, vol. xxxiv, pp. 79–121 (1923).

On Dec. 19, 1906, Mr. Charles L. Freer, of Detroit, Mich., bought, of an Arab dealer in Gizeh, near Cairo, four Biblical manuscripts. These were carefully studied by Prof. H. A. Sanders, of the University of Michigan. The results appear in the following volumes: *Old Testament Manuscripts in the Freer Collection*, Part I, *The Washington Manuscript of Deuteronomy and Joshua; The New Testament Manuscripts in the Freer Collection*, Part I, *The Washington Manuscript of the Four Gospels; The Old Testament Manuscripts in the Freer Collection*, Part II, *The Washington Manuscript of the Psalms*. These volumes, published in 1910, 1912, and 1917, form parts of the *University of Michigan Studies, Humanistic Series*. For the importance of the manuscripts see *The Classical Weekly*, vol. vi, pp. 214.

In the field of palæography we must mention E. A. Lowe, *The Beneventan Script, A History of the South Italian Minuscule* (1914), a book which C. U. Clark, in a review in *American Journal of Philology* (vol. xxxv, pp. 340–343), described as "the most important recent palæographic investigation in any language." A book on a kindred subject which falls within the decade is H. B. Van Hoesen, *Roman Cursive Writing* (1915).

In the remainder of this article, it will be possible only to name a few of the more important contributions made by American classical scholars in Greek and Latin literature, Greek and Roman history, Greek and Roman life, linguistics, and grammar.

The late Prof. John Williams White, of Harvard University, undertook to make a collation of all Aristophanic manuscripts. One outcome of this study was a volume, of nearly 400 pages, *The Scholia on the Aves of Aristophanes, With an Introduction on the Origin, Development, Transmission, and Extant Sources of the Old Greek Commentary on his Comedies* (1914). For an elaborate review of this book, by G. E Howes, see *The Classical Weekly*, vol. x, pp. 90–95. As a preliminary to that volume, Professor White had published *The Verse of Greek Comedy* (1912), reviewed by M. W. Humphreys (*The Classical Weekly*, vol. ix, pp. 141–144). Professor White died in 1917. In *Harvard Studies in Classical Philology*, vols. xxix, xxx (1918, 1919) appeared two articles, "Collation of the Manuscripts of Aristophanes' *Aves*," and "Collation of the Manuscripts of Aristophanes' *Vespæ*," by J. W. White and E Cary

At least three American scholars won distinction during the decade by their articles on Homer—G. M. Bolling, of Ohio State University, S. E Bassett, of the University of Vermont, and J. A. Scott, of Northwestern University. Professor Scott published also a volume, *The Unity of Homer* (1921). On general progress in Homeric studies see *New International Year Book* for 1921, p. 558.

Mr. Paul Elmer More, formerly literary editor of *The Nation* (New York), published three volumes on Plato *Platonism* (1917), *The Religion of Plato* (1921), and *Hellenistic Philosophies* (1923)

Works more general in character are *Athenian Tragedy, A Study in Popular Art*, by T. D. *Goodell*, (1920); and *The Greek Theatre and Its Drama*, by R C Flickinger (in two editions, 1916, 1922). Professor Flickinger's book is of prime importance in its field; for a notice of it see *The Classical Weekly*, vol. xvii, p. 197.

Important was an annotated edition, the first published in the United States, of Cicero, *De Divinatione*, by A. S. Pease, published in the *University of Illinois Studies in Language and Literature*, vols. vi, viii (1920, 1923). Two biographies of Cicero by classical scholars appeared: *Cicero of Arpinum, A Political and Literary Biography, Being a Contribution to the History of Ancient Civilization and a Guide to the Study of Cicero's Writings*, E. G.

Sihler (1914); *Cicero, A Biography*, T. Peterson (1919).

Of great service to the student of Horace is *A Concordance to the Works of Horace*, L. Cooper (1916). Prof. G. C. Fiske in a volume entitled *Lucilius and Horace, A Study in the Classical Theory of Imitation* (1920), examined again the whole question of the relation of Horace to Lucilius, his predecessor in satire. Prof. W. A. Merrill published many studies on Lucretius, dealing with his versification, imitations of his expressions by Vergil and other poets, etc. In 1918 he issued an edition of the text of Lucretius, complete (see *New International Year Book* for 1918, p. 492). Prof. Kirby Flower Smith, of The Johns Hopkins University, edited, with introduction and notes, the *Elegies* of Tibullus.

To Vergil, scholars of all countries were giving much attention. In America, two biographies of Vergil appeared: *Vergil, A Biography*, by Tenney Frank, of The Johns Hopkins University, and *Virgil's Biographia Litteraria*, by Norman W. De Witt, University of Toronto (1923). Both authors assume that the poems of the so-called *Appendix Vergiliana* were all—or practically all—written by Vergil himself, in his youth, and that we may, therefore, confidently rely on them for important information concerning Vergil's earlier years. Both books abound with interesting and stimulating suggestions on individual points, but as wholes they are to be used only with great caution, especially since there was nothing like agreement, during the decade, among scholars concerning the authorship of the pieces in the *Appendix Vergiliana*. At the close of the last century few scholars believed in their Vergilian authorship. F. Skutsch, however, in his *Aus Virgils Fruhzeit* (1901, 1906), set the pendulum swinging, for a while, in the opposite direction. The tendency to accept one or more of the poems in the *Appendix* as Vergilian, as work of Vergil's youth, is seen in the following articles, or books: Miss E. S. Jackson, "The Authorship of the *Culex*," *The Classical Quarterly*, vol. v, pp. 163–174; Th. Birt, *Jugendverse und Heimatpoesie Vergils, Erklarung des Catalepton* (1910: for reviews, by N. W. De Witt and H. W. Prescott, see *American Journal of Philology*, vol. xxxii, pp. 448–458, *Classical Philology*, vol. v, pp. 381–382); J. W. Mackail, "Virgil and Virgilianism, A Study of the Minor Poems Attributed to Virgil," *The Classical Review*, vol xxii, pp. 65–73; W. G. D. Butcher, "The Cæsura in Virgil and its Bearing on the Authenticity of the Pseudo-Virgiliana," *The Classical Quarterly*, vol. viii, pp. 123–131; R. S. Conway, *The Youth of Vergil* (1915); J. S. Phillimore, "The Text of the *Culex*," *Classical Philology*, vol. v, pp. 418–439; T. Frank, "Vergil's Apprenticeship," *Classical Philology*, vol. xv, pp. 23–38, 103–119, 230–244; E. K. Rand, "Young Virgil's Poetry," *Harvard Studies in Classical Philology*, vol. xxx, pp 103–185 (1919); A. R. Bellinger, "Catullus and the *Ciris*," *Transactions of the American Philological Association*, vol. liii, pp. 73–82 (1923).

But, latterly, the views of those who would accept the pieces in the *Appendix* as Vergilian was sharply challenged. Especially suggestive here was the work of R. S. Radford: "The Juvenile Works of Ovid and the Spondaic Period of his Art," *Transactions of the American Philological Association*, vol. li, pp. 146–171 (1920); "The Priapeia and the Vergilian Appendix," *Transactions of the American Philological Association*, vol. lii, pp. 148–177 (1921); "Tibullus and Ovid," *American Journal of Philology*, vol. xliv, pp. 1–26, 230–250, 293–318 (1923). Professor Radford believes that the whole Vergilian Appendix is the youthful work of Ovid, "composed by him in the period extending from 27 to 8 B.C." In the *Transactions of the American Philological Association*, vol. liii, pp. 5–34 (1923), Prof. H. R. Fairclough, of Stanford University, in a paper entitled "The Poems of the *Appendix Vergiliana*," after study of the vocabulary of the poems in the *Appendix*, maintained that "probably not a single one of these poems has been correctly assigned to Vergil."

More general works in the field of Latin literature are E. G. Sihler, *From Augustus to Augustine, Essays and Studies Dealing with the Contact and Conflict of Classic Paganism and Christianity* (1923), and E T. Merrill, *Essays in Early Christian History* (1924).

In the field of Greek history we may note, first, G. W. Botsford and E. G. Sihler, *Hellenic Civilization* (see *New International Year Book* for 1915, p. 497). C. W. Blegen wrote *Korakou, A Prehistoric Settlement Near Corinth* (1921), published by the American School of Classical Studies at Athens. The civilization unearthed by excavations at Korakou, a hillock 3 kilometers west of the site of ancient Corinth, is of the type known as "Helladic," a term (see under ARCHÆOLOGY) devised to distinguish the prehistoric civilization of the Greek mainland from the prehistoric civilization found in the Cyclades Islands ("Cycladic") and in Crete ("Minoan"). Mr. Blegen's book deals with remains dating from 2500 to 1100 B.C. Important, too, is M. Rostovtzeff, *Iranians and Greeks in South Russia* (1922).

Works on Roman history are the following: A. E. R Boak, *A History of Rome to 565 A.D.* (1921); T. Frank, *Roman Imperialism* (1914), *An Economic History of Rome to the End of the Republic* (1920), and *A History of Rome* (1923); T. S. Jerome, *Aspects of the Study of Roman History* (1923); G. Showerman, *Eternal Rome, The City and Its People From the Earliest Times to the Present Day* (1924).

In the field of Greek and Roman life we can mention only W. S. Fox, *The Mythology of the Greeks and Romans* (1916); W. C. Greene, *The Achievement of Greece* (1923); W. W. Hyde, *Olympic Victor Monuments and Greek Athletic Art* (1921), reviewed by G. H Chase, *The Classical Journal*, vol. xix, pp. 119–120, and D. M. Robinson, *The Classical Weekly*, vol. xvii, pp. 59–62; C. H. Moore, *The Religious Thought of the Greeks* (1916), and *Pagan Ideas of Immortality During the Early Roman Empire* (1918); E. Tavenner, *Studies in Magic From Latin Literature* (1916); L. Van Hook, *Greek Life and Thought* (1923).

In the field of Greek grammar, we name two important books, by H. W. Smyth, of Harvard University: *A Greek Grammar for Schools and Colleges* (1916), and *A Greek Grammar for Colleges* (1920). The latter book is worthy of a place beside the *Greek Grammar* of W. W. Goodwin, long the favorite Greek grammar of Greek scholars and teachers in the United States and in England. Of prime authority in its field is A. T. Robertson, *A Grammar of the Greek New Testament in the Light of Histor-*

ical Research (1914—there is a second, revised edition).

In the field of Latin grammar quite the most impressive achievement in America between 1900 and 1924 was the work of Prof. C. E. Bennett, *The Syntax of Early Latin:* Volume I, *The Verb* (1910), Volume II, *The Cases* (1914). This work completely supersedes all previous discussions of the syntax of early Latin. For reviews, by C. Knapp, see *American Journal of Philology*, vol. xxxii, pp. 333–343; vol. xxxv, pp. 268–293.

In linguistics three American scholars are doing excellent work—L. Bloomfield, R. G. Kent, and E. H. Sturtevant. The work of Professor Kent is to be found in the periodicals, especially in the *Transactions of the American Philological Association*. Professor Bloomfield published also a book, *An Introduction to the Study of Language* (1914). Professor Sturtevant issued two books: *Linguistic Change* (1917), and *The Pronunciation of Greek and Latin, The Sounds and Accents* (1920).

In lexicography, foremost was the monumental *Lexicon Plautinum*, by Prof. G. Lodge, of Columbia University, which had been in course of publication since 1901. Nine parts, totaling 864 large pages, and carrying the *Lexicon* into *Ita*, had been issued. Prof. M. N. Wetmore, of Williams College, published two important works, *Index Verborum Vergilianus* (1911) and *Index Verborum Catullianus* (1912); for reviews see *The Classical Weekly*, vol. vi, pp. 101-103, 109–111, 124. Professors W. A. Oldfather, A. S. Pease, and H. V. Canter, of the University of Illinois, published "Index Verborum Quae in Senecae Fabulis Necnon in Octavia Praetexta Reperiuntur," in *University of Illinois Studies in Language and Literature*, vol. iv (1918). Professors A. A. Howard and C. N. Jackson, of Harvard University, published *Index Verborum C. Suetoni Tranquilli Stilique Proprietatum Nonnullarum* (1922).

PHILOLOGY, MODERN. In making this brief sketch of the progress of philology during the 10 years 1914–1924, it behooves us to stress first of all the salient tendencies characterized by the vast volume of production in this ever-growing field of research. Thereafter the most important languages as viewed from the vantage point of intensity and originality of investigation—will claim our attention. To attempt to go further into detail is well-nigh impossible considering the space limitations. There shall even be no endeavor to list all the chief contributions made during this period, for such a classification would perforce be tentative and subject to the criticism of divergent opinion. The most carefully developed criteria often fail to be conclusive. It is necessary, therefore, that the selection be limited to such works as indicate the directions in which investigations are being carried on.

The War, which interrupted the period to which we are to devote our attention, had, from the philological point of view, two important consequences. On the one hand, it served to check, though not entirely, the outworn methods of investigation which had attained the zenith of their effectiveness before the close of the nineteenth century; while on the other, it made obvious to students of philology the vast possibilities that lay within their reach.

Already in 1914 it was noted in the pages of the *New International Year Book* that the study of philology was undergoing a process of transformation. The self-styled "Back to Nature" school founded in the early nineties by German scholars under the leadership of Schuchardt, a profound though not very original scholar, believed they could arrive at general laws, applicable to all possible cases, by means of the study of dialects. Their preferred method, so aptly designated *Sprachmischung*, or the mutual penetration of dialects, failed to satisfy expectations, because of the numerous historical factors and variable accessory circumstances which must always be taken into consideration. The new French school, with the equally profound and more brilliant Meillet at its head, hastened to reject entirely the esoteric philology which isolates linguistic facts from all contact with life, and began to interpret linguistics by the social movements of civilization—in a word, to seek in the development of languages the result of political and social actions. While the War retarded development of research along these lines by diverting the attention of the disciples of the French scholar into channels of a military nature, it served, however, to prove the truth of his contentions.

The year 1915 was most discouraging for philologists. Because of its appalling losses it was feared by some that the movement initiated by Meillet was destined to undergo entire arrestment of development. Notwithstanding the gloomy outlook, it was generally felt that, though retarded for the time being, the revolution—for such it has proved to be—would take place.

Toward the close of the year 1915, there appeared the two-volume epitome entitled *La Science Française*, the genesis of which was due to the initiative of the founders of the library of French thought at the International Exposition at San Francisco. In the second volume is to be found the very suggestive survey of linguistics (*La Linguistique*) by Antoine Meillet. According to this philologist, French scholars, although they entered this field of research long after the ground had been broken by the Germans, realized at once its possibilities. Notwithstanding that there have been numerous German schools of philology, there has never been a French school for the mere reason that *savants* of that nationality have always drawn their conclusions from data, and have refrained from accepting any theory that was not entirely in harmony with facts. At the outset, French philologists sought to approach the subject from every angle in order to bring all possible light to bear upon it. It is this above all which has led to the introduction of new fields of investigation, such as semantics, dialectology, phonetics and kindred subjects. The outcome of these methods was not only the monumental *Atlas Linguistique de la France* of Gilliéron and Edmont, of which, according to the eminent critic Gaston Paris, French scholarship may well be proud, the *Sémantique* of Bréal, in which are laid the foundations of the science of the development of meanings of words, and the *Dissimilation Consonantique* of Grammont, a work so original that we have not yet grasped its full significance; but also the *Histoire de la Langue Française* of Brunot which, says M. Jeanroy, has no equivalent in any other country, the great impulse given to experimental phonetics by the researches of Abbé Rousselot and others, the development along characteristic lines of

the school of Celtic philology, and finally, the rehabilitation of the spoken language made by Meillet himself in his suggestive contributions to the study of Armenian, Slavic and Greek. It is thus not so much by *des recherches de détail* (which, however, have their importance), as by the *introduction de vues neuves et de directions originales* that comparative philology has received new vigor from French thought.

Following the lead of Meillet, one of the editors of the monumental *Atlas Linguistique de la France*, J. Gilliéron, published at Neuveville, Switzerland, a series of lectures entitled *La Faillite de l'Etymologie Phonétique* in which he opened the attack from a new quarter. As the title indicates, the learned author admits the inadequacy of the methods in vogue, notwithstanding the yeoman service they may have rendered in the past, to cope with present-day problems. The mere fact that such a question is posed frankly and fearlessly by scholars of the rank of Gilliéron shows that philologists are alive to the new demands made upon them.

The most striking feature of the year 1921 was the great revival of interest in the study of language and its attendant problems. It seems that many Europeans have sought solace from the disillusionments of war in the inspiration furnished by President Wilson's cherished theory of self-determination according to linguistic and racial unity. This has been a most vital and stirring problem with all of these peoples more or less from almost time immemorial.

Encouraged no doubt by this general tendency, M. Meillet returned to the investigation of fundamental problems of comparative linguistics. In a volume of essays entitled *Linguistique Historique et Linguistique Générale*, published in 1921, this scholar laid definitively the basic principles for the reconstitution of the methodology of this subject. In his opinion, all languages show common tendencies, determined, on the one hand, by the structure of the vocal organs and the limited number of phonetic possibilities that they offer, and, on the other, by the laws of general psychology. These tendencies are obvious in such universal changes as the weakening of intervocalic consonants, vowel-breaking, or in the normalization of paradigms through the principle of analogy. "Le changement linguistique," says M. Meillet, "est lié à des faits de civilisation et à l'état des sociétés qui emploient les langues considérées." In so far as it is a means of communication between the members of a same clan or of a same nation, language tends either to become infinitely differentiated or to fuse its divergent dialects into a common speech, according to the inclination to division or unification of the groups or peoples that speak it The progress of language is inseparably bound up with the progress of society.

It is thus in extending our grasp of the great problem of linguistics that we are approaching more closely an understanding of the race as well as the individual. However imperfect language may be as an expression of our thought, it is nevertheless the sole means in our possession. It serves therefore in its limited way to reveal our mental attitude. As stated above, M. Meillet is thus leading philology from the arid domain of phonetic formulas into the very fertile, though most intricate, field of human life. Henceforth the term philology will signify much more than a mere juggling with forms: it is rather, to use the words of H. C. Wyld in his address on *English Philology in English Universities* (Oxford, 1921) "the study of human speech modified, altered, enriched at every stage by influences both literary and historical."

If we now turn to a more specific aspect of linguistics, i.e. grammar, we find that the same conditions obtain. In 1914, we noted that in regard to grammar there was a reaction against the study of the history of languages in favor of the general principles of the theory of language. O. Jespersen's *Modern English Grammar on Historical Principles* (Heidelberg, 1914) represents to a certain extent an effort to revive the teaching of grammar which, it may be said, had only slightly shown the effects of the progress of linguistics during the course of the century just passed.

It was while making efforts to broaden and improve their methods in accordance with modern scientific research that scholars became aware that, with the possible exception of philosophy, theology and medicine, the study of language was hemmed in and impeded on all sides by tradition and intolerance. From the more or less remote past we have inherited a rigid methodology applicable to dead synthetic languages but totally inadequate to solve the problem of the living analytic tongues and their relationship with a dynamic life teeming with new ideas. But, as history should teach us, there is no compromise with intolerance and tradition: and just as science was obliged to engage in open warfare with theology, so modern philology is entering the lists against its most redoubted and firmly entrenched opponent, which is our antiquated, though universally accepted, conception of grammar and its laws.

Consequently, *La Pensée et la Langue* (Paris, 1922), the stimulating volume by Ferdinand Brunot, the distinguished dean of the University of Paris, is in many respects an epoch-making work. Bearing as a sub-title *Méthode, principes et plan d'une théorie nouvelle du langage appliqué au français*, this manifesto by an author widely known for his monumental history of the French language mentioned above, purports to be a "methodical statement of facts derived from thought and interpreted and classified in its relation to language, and of the means of expression corresponding to them." After showing how every innovation in linguistic methodology has sooner or later been thwarted by a mediæval heritage of grammatical concepts and nomenclature—even comparative philology was obliged to surrender many of its revolutionary doctrines when confronted by a glowering and tyrannical tradition—M. Brunot observes that, thanks to the efforts of our "grammatical commissioners of police," the teaching of language to-day—like theology—is "a drudgery, the pet aversion of both pupils and teachers." Not even does orthographical reform escape the inquisition. And he passes in review many gross blunders that the high priests of grammar dole out to the young as established facts, such as a tense which they interpret as a mood, a future-perfect which has been disguised as a conditional, theories built upon misconstructions, etc. He adds, therefore, that it is high time to prepare a *Manual of Wrong Rules* as a pedagogical breviary which should protect the young against the "fundamentalism" of misguided

dogmatists. And therefore the object of M. Brunot's work is "the practical study of grammar with a view to enable the student to understand and express everything."

As a consequence of the rapid development of the cinematograph, the aëroplane and the radiophone, which are rendering geographical boundary an anachronism and are ameliorating international communication and, therefore, international good will, more widespread attention is rightly being devoted to comparative philology. Though only a century old, its influence in the cause of international understanding has been far-reaching. In past ages each country had the utmost contempt for foreigners unable to speak its tongue. To the ancient Hindus they were *mlecchas* (Prakrit *milicchu*, Pāli *milakkhu*, barbarian), 'incomprehensibles'; to the Jews, *gojim*, infidels'; to the Arabs *adscham*, 'babblers'; to the Turks *giaours* (Turkish *jawr*, *gawur* < Persian, *gaur*, 'infidel,' another form of *gabr*, 'infidels,' 'Gueber'), 'unbelievers,' 'miscreants'; to the Greeks *barbarophonoi* or *barbaroi*, 'stammerers,' and later 'uncultured' or 'barbarians' Even to-day the French *charabia* 'gibberish' (Spanish *alg-arabia*, the 'Arabic language'), or *baragouin*, 'jargon' (Breton *bara*, 'bread,' and *gouin* 'wine,' offered to the French invaders of Brittany), or the Mexican *gringo* (Spanish *griego*, 'Greek'), applied especially to the inhabitants of the United States, or the North American *wop* (Spanish *guapo*, 'handsome'), or *dago* (Spanish-Portuguese *Diego*, 'James,' a term of address) have all now assumed a pejorative connotation and betoken the same spirit of contempt for the foreigner But when comparative philology began to reveal that the so-called Indo-European languages were offshoots of the same parent stock, the alien tongue was no longer despised as the product of an inferior mind The finest compliments ever paid to a somewhat abstruse subject of research were the numerous efforts during the War to explain acts of aggression as a moral obligation to preserve continuity or relationship of speech.

Some one has suggested that the present period of the world's history will be designated in future times as the "dictionary epoch." In fact, never has such interest been shown in living foreign tongues. The vast number of dictionaries or vocabularies—of which a few titles have been noted in the pages of the *New International Year Book* in the 10 years furnishes a striking testimony to the desire of most nations to avoid cultural or commercial isolation. Likewise, the study of phonetics, which during the first half of its 40 years of history passed almost unnoticed, is now, as noted above, arousing widespread interest, especially because of the assistance it affords in pronouncing accurately a foreign tongue. In response to this great demand on the part of our public, several of our largest educational institutions are offering courses in this subject as well as opportunities for research And it may be added that the 10 distinguished foreign scholars, representing France, Spain and Italy, who lectured or taught in Columbia University in the summer of 1923. stressed the culture, civilization and language of their respective countries. A final indication of the awakening of the spirit of international fraternization may be gathered from the almost universal recognition of the need of a universal tongue. Since the decline of Latin in the seventeenth century, all efforts to create a substitute have been decried as the work of impractical idealists. But that these dreamers are now being taken seriously is obvious from an editorial in the *New York World* of Dec. 26, 1923, which affirms the necessity of a "radio language." In the spring of 1923 a movement to revive Esperanto as an international language was begun by a committee headed by Mrs. Dave Morris of New York; and their efforts are already bearing fruit, for many of our educational institutions, notably Columbia University, have now included Esperanto in their curricula of studies. See INTERNATIONAL LANGUAGE.

Bibliography. For further information see the series of articles entitled "Philology, Modern," appearing in the *New International Year Book* from 1910 on. Inspired, no doubt, by the example set by the *New International Year Book*, a number of British scholars began to issue in 1920 a *Year Book of Modern Languages* which contains extensive data.

General. F. de Saussure, *Cours de Linguistique Générale*, edited by Bally and Séchehaye (Paris, 1916–23); C. S. R. Collin, *Bibliographical Guide to Sematology* (Lund, 1915); A. Werner, *The Language-Families of Africa* (London, 1917); H. Schuchardt, *Sprachverwandtschaft* (Berlin, 1917); L. Dominian, *Frontiers of Language and Nationality in Europe* (New York, 1918); A. Meillet, *Les Langues dans l'Europe Nouvelle* (Paris, 1918); A. Aarne, *Vergleichende Rätselforschungen* (Helsingfors, 1918); H. Miller, *Die semitischvorindogermanischen Laryngalen Konsonanten* (Copenhagen, 1917); Abbé P. T. Mainage, *Les Religions de la Préhistoire* (Paris, 1920); H Schuchardt, *Sprachursprung* (Berlin, Pt. II, 1920); J. de Morgan, *L'Humanité Préhistorique* (Paris, 1921); J. Marouzeau, *La Linguistique ou Science du Langage* (ib.); E. Sapir, *Language* (New York, 1921); O. Jespersen, *Language, Its Nature, Development and Origin* (London, 1922); J. Vendryès, *Le Langage* (Paris, 1922); A. Dauzat, *La Géographie Linguistique* (ib., 1922); W. M. Thomas, *Language in the Making* (New York, 1923); E. W. Hopkins, *Origin and Evolution of Religion* (New Haven, 1923).

Indo-European. Works on the language of the primitive Indo-Europeans are devoted mainly to phonology and morphology. Among the more important are: H. Hirt, *Fragen des Vokalismus und der Stammbildung im Indogermanischen* (Strasbourg, 1914); K. Brugmann and B. Delbrück, *Grundriss der vergleichenden Grammatik der Indogermanischen Sprachen* (2d ed., 1916, Strasbourg); O. Schrader, *Reallexikon der Indogermanischen Altertumskunde* (2d ed, ib., 1917–); H. Güntert, *Indogermanische Ablautprobleme* (ib., 1916); W. Streitberg, *Erforschung der Indogermanischchen Sprachen* (Strasbourg, 1916); S. Feist, *Indogermanen und Germanen* (2d ed., Halle, 1919); C. Bartholomae, *Zur Etymologie und Wortbildung der Indogermanischen Sprachen* (Heidelberg, 1919); H. Hirt, *Indogermanische Grammatik* (Pt. II, Heidelberg, 1921); H. H Bender, *The Home of the Indo-Europeans* (Princeton, 1922); A Meillet, *Les Origines Indo-Européennes des Mètres Grecs* (Paris, 1923).

Indo-Iranian. Contributions to this field were less numerous. They consist principally of translations and grammatical and syntactical studies of texts. Somewhat out of the ordinary

are: Jouveau-Dubreuil, *Archéologie du Sud de l'Inde* (2 vols., Paris, 1914); Gauthiot, *Essai de Grammaire Sogdienne (Groupe Iranique)* (ib.); A. V. W. Jackson, *Catalogue of Persian MSS. Presented to the Metropolitan Museum of Art by A. S. Cochran* (New York, 1914); C. Bartholomae, *Zur Kenntnis der Mitteliranischen Mundarten* (Heidelberg, 1917); H. Oldenberg, *Zur Geschichte der Altindischen Prosa* (Berlin, 1917); and Sir G. A. Grierson, *Linguistic Survey of India* (vol. x, Calcutta, 1921) containing specimens of languages of the Iranian family.

Slavic. Among the numerous contributions, we may note Berneker, *Slavisches Etymologisches Worterbuch* (vol. i, A-L, Heidelberg, 1908–13); Vondrák, *Altkirchenslavische Grammatik* (2d ed., Berlin, 1914); J. Herzer, *Böhmisch-deutsches Wörterbuch* (Prague); R J. Kerner, *Slavic Europe* (Cambridge, Mass., 1918), a bibliography; H. H. Bender, *Lithuanian Etymological Index* (Princeton, 1922); L. Niéderlé, *Manuel de l'Antiquité Slave* (vol. i, Paris, 1923). Other studies include Slovenian, Ruthenian-Ukrainian, Russian, Czech (see *Year Book*, 1916, 1918, 1919; Baltic (1915, p. 499; 1920, p. 537; 1922, p. 563); Serbo-Croatian (1918, p. 495; 1915, p. 499); Serbian (1916, p. 537); Polish (1918, p. 495, 1916, p. 537); Ukrainian (1917, p. 537; 1918, p. 495); Lithuanian (1918, p. 495; 1920, p. 537; 1922, p. 563); Old Prussian (1918); Bulgarian (1919).

Celtic. Studies in Irish, Manx, Scotch, Welsh, Cornish and Breton as well as Gaulish and Pre-Celtic have appeared more or less every year. Among the more important are: C. Jullian, *Histoire de la Gaule* (4th vol., Paris, 1914); G. Dottin, *Manuel pour Servir à l'Etude de l'Antiquité Celtique* (Paris, 1915); John Strachan and J. G. O'Keeffe's edition of the *Táin Bó Cuálnge* (Dublin, 1916); *Catalogue of the Bradshaw Collection of Irish Books in the University Library of Cambridge*, 3 vols. (1916); K. Meyer, *Zur Keltischen Wortkunde* (Berlin, 1917–19); E. Cartailhac, *Dictionnaire Archéologique de la Gaule* (vol. ii, Paris, 1919); G. Dottin, *La Langue Gauloise* (ib., 1920); J. Loth, *Remarques et Additions à la Grammaire Galloise Historique et Comparée de John Morris Jones* (Paris, 1920); E. Le Blant, *Inscriptions Chrétiennes de la Gaule* (2 vols., Paris, 1923); J. D. Bruce, *The Evolution of Arthurian Romance from the Beginnings Down to the Year 1300* (Baltimore, 1923).

Germanics. Contributions to the Germanic languages are so numerous that it would be vain to list even the more important. The reader is referred therefore to various editions of the *New International Year Book*. Under the same general heading will also be found works in Frisian, Gothic, etc. Among these contributions are: J. Hoops, *Reallexikon der Germanischen Altertumskunde* (Berlin, 1915–19); Grimm's *Deutsches Worterbuch* (Leipzig); H. Fischer, *Schwabisches Wörterbuch* (Tübingen); *Jellinghaus-Förstemann, Altdeutsches Namenbuch* (Bonn); the *Schweizerisches Idiotikon, Worterbuch der Schweizer-deutschen Sprache* (Frauenfeld); J. Zupitza, *Einfuhrung in das Studium des Mittlehochdeutschen* (Chemnitz, 1916); J. Schatz, *Altbairische Grammatik* (Göttingen, 1915); A. Meillet, *Caractères Généraux des Langues Germaniques* (Paris, 1917); B. Delbrück, *Germanische Syntax* (Leipzig, 1916–19); H. Paul, *Deutsche Grammatik* (2 vols., Halle, 1916–17); E. Sievers, *Metrische Studien* (Leipzig, 1919); S. Feist, *Etymologisches Wörterbuch der Gotischen Sprache* (Halle, 1920); H. Hirt, *Geschichte der Deutschen Sprache* (Munich, 1919); H. Paul, *Deutsche Grammatik* (vols. iii, v, Halle, 1920); F. Kluge, *Deutsche Sprachgeschichte* (Leipzig, 1921); F. A. Wood, *Verner's Law in Gothic* (Chicago, 1922); E. Steinmayer and E. Sievers, *Die Althochdeutsche Glossen* (vol v, Berlin, 1922); O. Behaghel, *Deutsche Syntax* (Heidelberg, 1923); and A. Pinloche, *Etymologisches Worterbuch der Deutschen Sprache* (Paris, 1923).

Scandinavian. This group of indefatigable scholars made valuable contributions to Old Norse, Icelandic, Swedish, Danish, Norwegian, etc, such as the Swedish Academy's *Ordbok Öfver Svenska Sprâket* (Lund); Egilsson and Jónsson, *Lexicon Poeticum Antiquae Linguae Septentrionalis: Ordbog over det Nordisk-islandske Skjaldesprog* (Copenhagen); A. Torp, *Nynorsk Etymologisk Ordbok* (Christiania); Noreen, *Vart Sprak* (Lund); Klara Stroebe, *Nordische Volksmarchen*, edited by F. von der Leyen and P. Zaunert (2 vols., Jena, 1915); W. A. Craigie, *The Icelandic Sagas* (New York, 1915); *Diplomatarium Islandicum* (1310–1544) (Reykjavik, 1916); A. Kock, *Svensk Ljudhistoria* (vol. iv, Lund, 1920); O. Oestergren, *Nusvensk Ordbok* (Stockholm); E. Hellquist, *Svensk Etymologisk Ordbok* (Pt I, Lund, 1920); H. Hermannson, *Bibliography of the Eddas* (Ithaca, 1920); V. Dahlerup, *Det Danske Sprogs Historie* (Copenhagen, 1921); J. Jakobsen, *Etymologisk Ordbok over det Norrone Sprog pa Shetland* (4 vols., Copenhagen, 1908–21); V. Dahlerup, *Ordbog over det Danske Sprog* (vol. iii, Copenhagen, 1922); E. Sievers, *Die Edda Lieder* (Leipzig, 1923).

English. As no selected list of works could do justice to such an extensive collection, we will limit our attention to Dr. Murray's *New English Dictionary* (Oxford); H. Harrison, *Surnames of the United Kingdom* (London); *Crabbe's English Synonyms* (Anniversary edition, New York, 1917); H. L. Mencken, *The American Language* (New York, 1919); P. G. Thomas, *Introduction to the History of the English language* (London, 1920); R. W Chambers, *Introduction to the Study of Beowulf* (ib., 1920); H. C. Wyld, *History of Modern Colloquial English* (ib., 1920); K. Luick, *Historische Grammatik der englischen Sprache* (Leipzig); E. Weekley, *Etymological Dictionary of Modern English* (London, 1921); T. N. Toller, *Anglo-Saxon Dictionary* (Oxford, 1922); R. Huchon, *Histoire de la langue anglaise* (Paris, 1923).

Romance. The continued activity of scholars in this domain bespeaks the immense wealth of material at the disposal of the philologist. Incessant publication of new texts has had as a consequence reorganization of material and revision of methods. As examples may be cited Meyer-Lübke's *Romanisches Etymologisches Wörterbuch* (Heidelberg); Bédier's celebrated *Légendes épiques* (Paris, 2d ed., 1922) of which the first edition was completed in 1913. Other works are G. Nicholson, *Recherches Etymologiques Romanes* (Paris, 1921); E. Bourciez, *Elément de Linguistique Romane* (ib. 1923); G. Millardet, *Linguistique et Dialectologie Romanes* (ib., 1923).

French. K. Nyrop, *Grammaire Historique de la Langue Française* (3d ed., Copenhagen); A. Tobler, *Altfranzösisches Wörterbuch*, edited

by E. Lommatzsch (Berlin); A. Haase, *Syntaxe Française du Dix-septième Siècle* (trans. by M. Obert, Paris, 1916); F. Brunot, *Histoire de la Langue Française des Origines à 1900* (vol. v, Paris, 1917); K. Vossler, *Französische Philologie* (Gotha, 1919); L. Gauchet and J. Jeanjaquet, *Glossaire des Patois de la Suisse Romane* (vol. ii, 1920); J. Gilliéron, *Etude de Géographie Linguistique* and supplement to vol. i of the *Atlas Linguistique de la France* (Paris, 1921); A. Longnon, *Les Noms de Lieux de la France* (Paris, 1920–22); G. Ertiger, *Französische Synonymik* (Dresden, 1922); P. Barbier, *English Influence in the French Vocabulary* (New York, 1922); W. von Wartburg, *Franzosisches Etymologisches Wörterbuch* (Bonn, 1922); J. Vising, *Anglo-Norman Language and Literature* (Oxford, 1923); P. Désormaux, *Bibliographie Méthodique des Parlers de Savoie* (Paris, 1923).

Italian Diatechology and lexicography have held the attention of Italian scholars. Among these works are G. Bertoni, *Italia Dialettale* (Milan, 1916); E. Monaci, *Studi Romanzi* (Rome, 1917); V. Restori, *Dal Latino Plebeo all' Italiano Illustre* (Mantua, 1923); L. Spitzer, *Italienische Umgangsprache* (Bonn, 1922); and G. Saccà, *La Lingua Italiana e la sua Evoluzione* (Catania, 1923).

Spanish. The numerous dialects spoken over the vast territory once forming the colonial possessions of Spain afford an inexhaustible subject for the philologist. Among the contributions are the 14th edition of the *Diccionario de la Lengua Castellana*, by the Spanish Royal Academy (Madrid, 1914); *Diccionario Gallego-Castellana* by the Royal Galician Academy (Coruña); A. Castro and F. de Onis, *Fueros Leoneses* (Madrid, 1916); Spanish Royal Academy's *Gramática de la Lengua Castellana* (new edition, Madrid, 1917); M. A. Roman, *Diccionario de Chilenismos y de Otras Locuciones Viciosas* (5th vol., Santiago de Chile, 1916–18); R. Foulché-Delbosc and L. Barreau Dihigo, *Manuel de l'Hispanisant* (vol. i, New York, 1920); A. Zauner, *Altspanisches Elementarbuch* (Heidelberg, 1921); and R. Menéndez Pidal, *Documentos Linguisticos de España* (Madrid, 1923).

Dictionaries, etc As we have noted heretofore, because of the numerous languages involved in the War, public attention became focused on language study. However, to meet the immediate emergency a vast number of dictionaries, language manuals, and phrase books were published containing vocabularies not only of the numerous sciences drafted into the War, but also for commercial intercourse and even social amenities. During the War an attempt was made by the writer to supply a fairly complete list of such manuals and dictionaries. Space limitations make it impossible of repetition here. The reader is therefore referred to the following editions of the *New International Year Book:* 1915, p. 502; 1916, pp. 537–540; 1917, pp. 536–537; 1918, pp. 494–497; 1919, p. 522; 1920, p. 539, etc. Likewise for the interest developed in the courses conducted in many American universities and colleges for prospective officers enrolled in the Students' Army Training Corps, see the *New International Year Book* for 1918 (pp. 495–496).

PHILOSOPHY. The developments of greatest philosophical significance in the field of natural science were incidental to the attempt of the scientists to find a way of passing from one supposedly discreet science to another. The attempt to bridge the gulf between mathematics and physics issued in the theory of relativity; similarly the attempted transition from physics to chemistry resulted in the statement of the problem of the structure of the atom and the quantum theory as a tentative answer. Less was done to articulate biology with its forerunning sciences because the questions in that region are still manifold, but the controversy over vitalism and mechanism and the investigation of colloidal substances is significant. Psychology, at least in the English-speaking world, was in great danger of being subsumed under the other sciences such as physics, biology and physiology, rather than being recognized as sufficiently independent to warrant the assignment of a special place and function in the scientific field. However, if we recognize the psychologist's hope of differentiating psychology proper, social psychology and the psychology of society and sociology, we could make a fairly complete picture of the intellectual market place of 1924—a picture which would gratify a follower of Comte at any rate.

However, this tendency to integrate the sciences did not exactly follow the lines of development laid down by Comte. Neo-positivism accounted for scientific thought in terms of mathematical correlation. Its chief spokesman reduced scientific hypothesis to the level of mathematical equation; the entity hypothesis was excluded as far as possible; the terms in these equations were merely convenient expressions substituted for observations and thus made amenable to mathematical treatment. This intellectual asceticism was justified by the facility it contributed to the scientific treatment of experience. It also enabled the scientist to appeal to mathematical presuppositions instead of outworn metaphysics when he was hard pressed to give some further account of his theories.

This need for interpretation, especially with regard to scientific formulas which involve non-Euclidean geometry, led to the further development of postulate theory and mathematical logic. So when, in 1919, it appeared that at least one of Einstein's predictions, which were based largely on non-Euclidean geometry and rather unconventional postulates, had been verified, greater importance was attached to the work of Peano, Frege, Cantor, Dedekind, Whitehead and Russell in mathematical theory. Here was observational evidence not only for Einstein's theory of relativity, but a naïve philosophical mind was tempted to conclude that the mathematical presuppositions were also verified. Some not so well trained in mathematical theory were tempted to claim verification for their own special brand of metaphysics on the same ground. The discovery of the displacement of Mercury at perihelion was like Thales' discovery of the marvelous uses of the waters of the Nile and the subsequent founding of the Ionian school of nature philosophies: water, fluid, ice, steam, mathematics, non-Euclidean geometry, postulates, mathematical logic. We now had a scientific method in philosophy.

The more cautiously minded mathematicians and scientists disowned any such extrapolation, and rejoiced over the great advantages afforded by the theory of relativity for scientific method. The more philosophically minded saw the problem of rendering such an enormous system in-

telligible not so much for science as for human culture. Whitehead resolved to recast the fundamentals of physics to fit in with the new theory, and for this found his method of extensional abstraction most convenient. Cassirer, a neo-Kantian, took the opportunity to show how the Platonic element in the Kantian *a priori* had in it the capacity to assimilate the new mathematical physics and thus discharge the obligation to be intelligible, which science had neglected to fulfill. Brunschvieg found it possible to go still further and link up the Spinozistic tradition of intellectual intuition or judgment with the equally Spinozistic "world of numbers" presented by Einstein. Out of this approach there results an onward march of man, the author of science.

Running along beside these theories of relativity, which are concerned mainly with the application of mathematics to astronomical physics, were the investigations of the structure of the atom, which use other and apparently divergent mathematical hypotheses. Here again the naïve mind found a springboard for metaphysics, and the cautious critical mind contented itself with mathematical correlations. The philosophical significance seems to lie in the field of epistemology rather than in logical theory as in the case of relativity. Philosophers of physics like Broad attempted to include and articulate the psychology of perception processes with physical action, while G. E. Moore supplied a Platonic metaphysics to support it.

The other natural sciences present problems like these, though less clearly formulated. The best scientific mind uses imagination and mathematics, the best philosophical mind criticizes and sets the results in consistent order, and this is fortunate for science. But it should be remembered that this is science, with philosophy as handmaiden. The scientist discovers and classifies, calling for philosophical criticism only to render his material intelligible, when no further progress can be made without such insight. Insight or wisdom performing this function is intellect domesticated or enslaved; mathematics and logistics take the place of logic; ethics, æsthetics, and metaphysics are ignored. Yet one sees in this commandeering of the philosophic insight and intuition the start of a return to the greater tradition in philosophy. The reference of scientific findings to an intellectually grasped or constructed system is not a new trick. One remembers that Plato found a function for hypothesis in his ascent to the ideas. Also, one must not forget that the modern procedure is not accidentally Platonic. The earlier Russell did not despise Platonism, and the latest Santayana embraces it with true æsthetic enthusiasm. What matters it that system or essence is substituted for the idea? Cassirer is not frightened by the dialectic Nemesis that follows.

The rivals to this positivistic naturalism are the modern humanists. One would like here to review the so-called realistic and psychological novel and compare it with the Greek tragedy as the objectification of opinions on fundamentally philosophical themes. Or, on another level one might sift behavioristic and Freudian psychology for nuggets of wisdom, but here again we find the professional philosopher buying and using the novelist's and scientist's knowledge. The rationale of his doctrines is the biologist's or the sociologist's dogmas. The most obvious illustration of this is the pragmatic tradition in America. James, Freud, and Watson have sold their functional psychologies to both the professionals and the guildsmen of humanistic sciences. Their psychologies are ultimately physiological, biological, or sociological, and the philosophizing which one finds is the reference of this or that particular fact to one of these systems. Humanism means then that man the organism, man the psyche, man the citizen of a commonwealth is the measure of all things. Glands, unit characteristics, instincts, conditioned responses, complexes, survival value, adaptation, social expediency are terms to conjure with. They are the inner fates and Nemesis of our human existence Yet the relativism of these concepts is admitted in the writings of Dewey, Pound and McDougall. Man's creative intelligence measures, and moves on.

In France, Durkheim and Lévy-Bruhl and in England Westermarck and Hobhouse set up the science of anthropology as a system of reference. Æsthetics, logic, ethics, all have a genesis and *raison d'être* in man's social experience. *Mores*, taboos, and ritual supply the necessity of man's life and knowledge. But there was a more sophisticated European tradition which had not only appropriated but assimilated the concepts of biology and anthropology. It not only avoided but condemned what it called psychologism. It reduced scientific classification and subordination to the level of arbitrarily specialized categories, and asserted the superiority and finality of the intuitive comprehension of experience. It drew upon Spinoza, Kant, and Hegel. It placed the æsthetic at the foundation of knowledge and the ethical at the top and demanded the integration of this or that bit of knowledge in the light of the immediately given whole. However, that it paid for its sophistication is evident from the difficulties it encountered. More often than not an attempt was made to characterize its ultimates in terms of its most hated scientific discreetness. Bergson never escaped the biologism of his *élan vital;* Croce fell into the Hegelian fiasco of identifying spirit with human history; Brunschvieg fell short of Spinozistic substance and was content with the onward march of man through his flux of experience. Humanism had its usual limitations. Santayana's Realm of Spirit illumines, enchants, and dies away.

These were the market place brands of philosophy in the year 1924. They were already the history of the last decade, but the discussion of the market place continued. What would come of it? It would be dangerous to prophesy, but history is not complete until an inventory of possibilities is taken. For that purpose, we may return to our analogy. If that is legitimate, we may look forward to a philosophical renaissance in the near future. First, the Platonism of the so-called realists remained; it is the *sine qua non* of all genuine philosophy Second, the mentalism of the so-called idealists had come to stay. Further, the two could not be mixed. Santayana's *Scepticism and Animal Faith* and the crudities of his behavioristic synthesis is evidence enough of that. The task facing all critical and honest philosophers in the year 1924 was to give some account of induction or the reference of the given to a system, and it was not to be solved by animal faith or divination. Messrs. Russell and Whitehead

used a suggestive device in the *Principia Mathematica* to solve the problem of mathematical induction. The number system, as we know, allows this extrapolation that means so much in all mathematics, but no one could say how or why. The authors faced the problem, admitted defeat; and assumed mathematical induction and proceeded to define the number system in such a way as to insure the validity of the inductive process. The idealists used to employ this device, and built up systems on which one could find perspective and order for the human life of their day. These perspectives and insights are inadequate for our world; to return to them or even to Aristotle and Aquinas is impossible, but with a Kant or a Socrates the sophistries and subterfuges of our popular philosophies would be uncovered and a way made for the courage and insight of a genius who could then make the spiritual affirmation and illumine the whole so that all could see and be wise.

Bibliography. Samuel Alexander, *Space Time and Deity* (2 vols., 1920); *Proceedings of Aristotelian Society*, sup. vol. iii: *Relativity, Logic and Mysticism* (1923); A. J. Balfour, *Theism and Thought* (1923); Henri Bergson, *Mind Energy* (1920), *Durée et Simultanéité* (1922); Bernard Bosanquet, *The Meeting of Extremes in Contemporary Philosophy* (1922); C. D. Broad, *Scientific Thought* (1923); Léon Brunschvicg, *L'Expérience Humaine et la Causalité Physique* (1922), *Spinoza et ses Contemporains* (1923); H. Wildon Carr, *A Theory of Monads* (1922); Ernst Cassirer, *Substance and Function, and Relativity* (1923); Benedetto Croce, *History, Its Theory and Practice* (1921); John Dewey, *Human Nature and Conduct* (1922); Emile Durkheim, *The Elementary Forms of the Religious Life* (1916); S A. Eddington, *Space, Time and Gravitation* (1921); Giovanni Gentile, *The Theory of Mind as Pure Act* (1922); Viscount Haldane, *The Reign of Relativity* (1922); L. T. Hobhouse, *Social Development* (1924); John Laird, *A Study in Realism* (1917); Lucien Lévy-Bruhl, *Primitive Mentality* (1923); C. Lloyd Morgan, *Emergent Evolution* (1923); G. E. Moore, *Philosophical Studies* (1922); J. H. Muirhead, *Contemporary British Philosophy* (1924); A. D. Ritchie, *Scientific Method* (1923); L. Rougier, *La Philosophie Géometrique de Henri Poincaré* (1920); Bertrand Russell, *Introduction to Mathematical Philosophy* (1919); George Santayana, *Scepticism and Animal Faith* (1923); *The Unknowable* (1923); Societas Spinozana, *Chronicon Spinozanum*, i, ii, iii (1921–24); E. W. Westermarck, *The Origin and Development of Moral Ideas* (1917); Alfred N. Whitehead, *The Principle of Relativity* (1922), *The Concept of Nature* (1920), *Natural Knowledge* (1919).

See INSTINCT; PSYCHOLOGY; ÆSTHETICS; CONSCIOUSNESS AND THE UNCONSCIOUS.

PHŒNIX GROUP. See PACIFIC OCEAN ISLANDS.

PHONETICS. See PHILOLOGY, MODERN; and PHILOLOGY, CLASSICAL.

PHOSPHATE ROCK. The abundant supplies of phosphate found in the United States offset the utter deficiency of nitrates and potash. These three materials are essential fertilizing substances for agriculture and where not available must be imported. In 1920, the world's production of phosphate rock was estimated at 6,725,215 long tons, of which the United States produced 4,170,056 long tons. This, of course, was a record production, there being subsequently a marked decline. The phosphate deposits of Florida furnish from 75 to 85 per cent of the annual American output, and are followed by Tennessee and Kentucky. The two main types of phosphate rock are hard rock and pebble. The Florida deposits are mainly land-pebble rock, while the Tennessee deposits are of various types. In the western United States, phosphate rock has been discovered chiefly in Idaho, Wyoming and Utah, where they occur near the base of the Carboniferous. In 1924, the United States had two extensive phosphate reserves, one in Florida and one in the Western States, and there was no anxiety regarding future needs In fact, high-grade superphosphate had been produced by a copper-mining company from material mined in one of the Rocky Mountain States.

In 1920, over a million tons of raw phosphate rock were exported, valued at over $11,000,000, in addition to over 80,000 tons of superphosphate valued at $3,000,000. Nearly all of these deposits went to Europe, chiefly to Germany, Spain, Holland and Belgium, as the United States was the world's largest producer, followed by Tunis and Algiers. In 1913, the sales of phosphate rock in the United States were in excess of 3,000,000 long tons, but it declined during the War until 1915 when there were below 2000 tons with a further temporary decline in 1919. They then rose to over 4,000,000 tons in 1920, which was the banner year for the American industry. The quantity of phosphate rock sold in the United States in 1922 was 2,417,883 long tons, valued at $10,482,846, as compared with 2,064,025 long tons, valued at $12,270,070 in 1921. Of all the phosphate rock sold in the United States in 1922, 85 per cent was sold by Florida, whose sales amounted to 2,058,593 long tons valued at $8,347,522. Tennessee was the next largest producing State, with a sale of 353,309 long tons valued at $2,107,382 (including a small quantity of brown rock from Kentucky). Idaho was the only western State that produced phosphate rock in 1922.

PHOSPHATES. See FERTILIZERS.

PHOSPHORUS. See CHEMISTRY.

PHOTOGRAPHY, AÉRIAL. See AËRONAUTICS.

PHOTOPERIODISM. See BOTANY.

PHOTOSYNTHESIS. See BOTANY; CHEMISTRY, ORGANIC; PHYSICS.

PHYSICAL CHEMISTRY. See CHEMISTRY, PHYSICAL; BIOCHEMISTRY.

PHYSICS. The discovery of X-rays, radium, the electron, and the constructive theories of the quantum, relativity, and the nuclear atom inaugurated an unprecedented advance in physical science during the first quarter of the twentieth century. Any attempt prior to this epoch to substitute for Newton's laws and Euclidian geometry laws of superior rigor would have been deemed heresy. The quantum of Planck and the relativity equations of Einstein have won their way steadily to a commanding position, the one by the beauty with which it fits observed phenomena, the other by the accuracy with which it predicts quantitatively phenomena contrary to those of classical mechanics. The one began as an empirical necessity, the other as a logical necessity; both have been astonishingly successful in their agreement with the observed facts of nature.

New theories, new tools of research, extended facilities, have stimulated the imagination and the creative activities of physicists so that cosmic theory is now applied to the motions and energies within the atom as well as to the sweep of the entire stellar system in the vast orbits which the stars are now presumed to describe in space The unit of energy is found, the atomicity of action discovered, and the whole numbered orbits, and whole number relations of atomic energies and spectra are working parts of the crucial attack on the problem of atomic structure

An astonishing increase in the kind of facilities available for physical research has taken place, and an equally amazing increase has taken place in the magnitude of such facilities. Physics is now cosmic in scope. It takes the crucibles of the sky as experimental laboratories. The stars and planets are dynamic systems, graphic points on the chart of the sky whose coördinates measure millions of light years and whose time scale is equally vast. This gives the physicist observational access to dynamic systems a hundred billion times the size of our own sun, and some of them four or five times hotter. It reveals systems moving through space a hundred times faster than the sun, and in all stages of stellar evolution.

The merging of astronomy and physics has created a new order for the physicist, has within a few years increased his perceptible universe to millions of times its former size. At the other end of the scale, the facilities of the physicist have grown in number and power. The atom gives him a glimpse of forces of the order of a million times those of the highest explosive created by man. For example, when the radium atom explodes it is on such a scale that if the earth exploded with relatively the same proportionate violence, it would drive off a mass equal in size to the United States, leave a crater a thousand miles deep, and never return for its speed would be 12,000 miles per second The physicist is to-day in the presence of forces hitherto undreamed of.

The production of two million volts, the maximum at this writing, foreshadows the attainment, perhaps surpassing, of the voltages of natural lightning. Model villages are now being experimentally struck by artificial lightning under measured control, in order to develop efficient protection from lightning.

Again electron tubes have been developed with 1000-kilowatt output, using 1800 amperes at 12 volts and a filament thick as a lead pencil. Electron tubes are reaching such proportions that world-wide telephony seems a certainty in the near future, and the physicist is at the same time being given facilities of which he had not conceived the possibility Again, X-ray apparatus has been developed in recent years to a point where hundreds of thousands of voltage may be used, permitting the body to be photographed in a fraction of a second where a half hour was formerly required. X-ray motion pictures are technically accessible to the physicist. The interior mechanism of machines has been photographed, the inner structure of natural stones, pearls, and even of metals is easily studied by this new-found radiation.

Another and really sensational tool of the physicist is the alpha particle, or the ejected helium nucleus from the radium atom. Easily the most powerful projectile known to science, it became in the hands of Rutherford a means of disrupting the nuclei of the lighter atoms, thus achieving the first controlled transmutation of the elements.

Another facility recently developed into a powerful research facility for the physicist is the positive ray spectrograph Thompson, Goldschmidt, Dempster, and Aston have perfected means of projecting and deflecting the positive and negative parts of the atom after disruption so that they leave traces on the photographic plate at distances which may be translated directly into mass indications This has permitted the discovery not only of masses of different elements, but the different masses of the isotopes of any given element. Neon atoms of masses 20 and 22, in number 90 per cent and 10 per cent respectively, have thus been detected.

The quite astonishing verification of Prout's hypothesis of a common building material with whole numbered multiples of this constituting the atoms of the elements, has thus been achieved since 1915, based upon the thoughts of prior writers who have frequently suggested that the usual atomic weights are not fractional, but average weights of variant atoms. Atoms of the same element varying in mass are isotopes having the same behavior. Atoms of different elements may have the same weight and different behavior—for example, lead and bismuth derived from thorium (disintegration) have atomic weight 208 but display the characteristic behavior peculiar to each element notwithstanding. Positive ray analysis permits the discovery quite unexpectedly of undissociated groups of atoms. The method is now available as a most powerful tool for the physicist.

Devices have been developing for measuring the X-ray patterns as reflected by the space lattices of crystals, and thus disclosing the distribution of the atoms in a crystal. The significance of crystal lattice study as practiced to-day is that the fundamental fine structure of crystals is now possible. The ordinary amorphous or mixed solid has been likened to an orchestra at practice, each player playing the same tune, but at different points in the piece, but that in crystals the atoms, like the players, are all playing the same tune at the same place in the piece, so that at once the melody is apparent. Something like this is the view of the crystal gazer of to-day who is allocating the ions and atoms, and even the electrons to their proper places in the space lattice Astonishing results have already been attained.

The crystal lattice appears now as dependent upon the number of outer electrons, the form being the same for any given column of the periodic table. Such lattice is geometrically demonstrable as the natural position. For example, the alkali atoms have body-centered cubic structure, since the outer electron and the remainder of the atom form two parts which being respectively negative and positive arrange themselves in space alternately in the elements of a body-centred cube. Likewise the column two atoms, with two outer electrons in each atom form a hexagonal space lattice, the electrons at the angles of a hexagonal prism and the ion at the centre of the prism. Crystal structure thus becomes the same periodic function of the atomic number as the other properties of the elements. Hull expects that this method will

yet reveal the position of the binding electrons in the crystal lattice directly.

As a result of the determination of the intra-crystal orientation of the atoms, the crystal forms arrived at give simple and natural explanations of certain physical properties of these substances. For example, aluminium and other face-centred cubic arrangement of atoms (an atom at each angle and at each face-centre) are soft and ductile. The reason is simple There exist four planes in such cubes in which the atoms are so closely packed that one plane slips easily over the one below without elevating it, hence with minimum change in the attractive distances between the atoms Less ductile are the body-centred cubic metals (an atom at each angle and one at the cube centre) since they are more fully interlocked and the interatomic attractive distance must change during gliding. This group includes such metals as iron and tungsten.

The hardness of the diamond is quite naturally attributable to the tetrahedral arrangement in which gliding is impossible since the atoms in this type are interlocked in the most stable manner. Shore has found that the diamond under good conditions can support a load of two million pounds per square inch. Hull states that simple cubic salts such as lithium fluoride and sodium chloride do not permit gliding since the atoms are bound electrostatically, each ion being surrounded by six opposite charges.

Relativity. The year 1915 was notable for the publication of Einstein's (q.v.) short but epoch-making paper on his generalized theory of relativity. This, with his paper published in 1905 on the special theory of relativity, has wrought the most profound advance in physics since Newton The finitude of the material universe, the derived non-objectivity of time and space, the meaninglessness of absolute motion, the effect of gravitational fields on light and other radiant energy, the equivalence of mass and energy, the acceptance of time as a fourth coördinate, the introduction of the relativity effect of the finite velocity of light into physical equations, and the establishment of purely relativity equations—all these were so new to the physicist who had not followed the course of philosophical or mathematical theory that skepticism, even ridicule, greeted the new theory set forth by Einstein.

To demonstrate his theory, Einstein selected three necessary results of the theory which might be tested by observation, each of them contrary to the classical laws of mechanics and inexplicable under classic physics. He even predicted these results quantitatively by the simple use of his relativity equations unmodified by special assumptions. The three predictions have now been confined by observations of unquestioned precision. The agreement is better than 1 per cent. Classic physics was shown to have failed in crucial tests. Einstein's view that time and space are abstract derivatives of reality and in themselves unable to control or influence anything is certain to have a profound effect in recasting physics. At the same time, space and time are made joint coördinates of the four-dimensional continuum for the graphic plotting of an event.

Testing the Relativity Theory. The first test of the relativity theory was the mathematical determination by relativity equations of the full value of the rotational precessional of the perihelion of the planet Mercury. The rotation is in the direction of motion of the planet and was inexplicable according to Newton's laws by an amount equal to 43 seconds of arc per century. The Newtonian failure was notable, small as it was. Using relativity equations without special assumptions, Einstein computed the true rate of rotation of the perihelion of Mercury to within one second of arc per century. His success was astonishing and furnished the first confirmation of his theory.

The relativity effect on the apse of Venus is too small to observe since the orbital eccentricity is too small. The relativity effect of like character has been observed for the planet Mars but observational confirmation of the exact amount must await fuller data. In the case of Mercury, Einstein amended the inverse square law by changing the square or "second-power" of the distance to read the "2 00000010 power" of the distance. Slight as it is, it affords confirmation of the theory which is destined to play a reorganizing part in physical theory. For example, the fine structure of spectrum lines involves the change of mass resulting from relativity effects on the elliptical orbits of the electrons by which the perihelion increase in mass with increased speed alters the frequency of the electron revolution about the nucleus. In other words, relativity has, perhaps, one of its strongest confirmations in the structure of each spectrum line, since the fine structure is a graphic portrayal of the actual effects of relativity.

A second triumph even more spectacular was the confirmation of Einstein's prediction that gravity affects light and that starlight passing the sun's disk at grazing incidence would be deflected on his theory by an amount twice the value to be looked for from classical theory. Maxwell long before had shown that light waves should exert pressure. Years later experiment confirmed the prediction The doctrine of conservation of momentum implied that light carries moving mass. The wave front having momentum and exerting a pressure is in a sense "temporary matter" which might be affected by gravity.

This was put to the test at the eclipse expedition of May, 1919. It was only at a total eclipse that the stars could be photographed to test the theory by recording their apparent position. If the photographic images near the eclipsed sun during totality showed displacement equal to that predicted by Einstein—double that called for by classical mechanics—it would be strong evidence for the relativity theory. But if the amount was one-half that predicted by Einstein, then Newtonian laws might account for the displacement.

Decisive success came on May 29, 1919, when at Principe light from near-by stars was found deflected by the sun almost equal to that predicted. At Sobral the deflection found was slightly in excess. Campbell in 1922 in the most careful eclipse observations yet made found his observations as finally adjusted gave 1.75′ and agreed within about a half of one per cent with the Einstein prediction. The mass of Jupiter is great enough to produce a perceptible deflection and an occultation of a star by this planet may yet be a favored method of studying this phenomena. Einstein had said that a hundred experiments might support his

theory but that one adverse result would destroy it.

The third prediction to be verified was that in the gravitational field of the sun light waves would be lengthened—for example, about 0.008 Angstrom unit for blue light of wave length 4000 A. Grebe and Bachem, however, in 1920 reported that they had detected a lengthening equal to the recession of the light source 0.56 kilometer per second as compared with Einstein's prediction that it would equal a recession of 0.634 kilometer per second. An atom in the sun was thus shown to vibrate at a slower rate than a similar atom on the earth. St. John, at Mt. Wilson Observatory, reported to the National Academy, at its 1924 session at Washington, that he found confirmation of this predicted effect in an elaborate series of measurements of the shift of spectrum lines.

The abstract mathematics used to enunciate Einstein's theory were such that few physicists could follow the reasoning. The verification, however, of three predictions contrary to classic mechanics could be comprehended by all but could be ignored by none.

In the words of Planck, Einstein's theory "surpasses in boldness everything previously suggested in speculative philosophy and even in the philosophical theories of knowledge," and that "the revolution introduced into the physical conceptions of the world is only to be compared in extent and depth with that brought about by the introduction of the Copernican system of the universe."

Trend of Modern Physics. Modern physics has been the sphere of so many and such fundamental series of discoveries that there was pressing need for a complete restatement in terms of fundamental elements. Slowly through the centuries, the consequences of these elements have become simpler as identities were found. Parallel to this the consequences of the interaction of these elements have become more complex. Man's control of these elements has become so great that to-day he can take the electron from an atom and study the light produced when another electron takes its place. This example is a type and a forecast.

The trend of physics is steadily toward the complete control of the ultimate elements of matter and of energy, the ultimate units with which physics has to deal. To restate the fundamentals of physics does not mean that we have completely mastered either the elements or the principles governing their interaction. A true restatement merely implies a more fundamental basis. The superstructure is yet to be built.

The success of the new physics based on the fundamental units of matter and energy foreshadows greater triumphs to come. The crucial fact is the identity of matter and energy from which follows the identity of the electron and the unit electric charge, so that matter and energy, the basis of action, have one and the same essence. The electron thus becomes the focus of the vast movement in science and philosophy, a twofold movement of human thought seeking the ultimate unit of matter on the one hand and the ultimate unit of energy on the other. The two paths led to the same ultimate unit—the electron pair.

Exactly as matter has been unified and the elements ranged in an evolutional sequence consecutive and alike in essence, so radiation from electric waves (gamma) 2×10^{-10} cm. to those of radio wave lengths has been unified into a continuous spectrum of 55 octaves. Fluorescence, which is frequency transformation of light waves, seems destined to give the means of transforming any frequency of electric waves from the shortest gamma to the longest to any other desired frequency. This is the analogue of the transmutation of the elements. It is true that neither is fully at hand, but with the fast perfecting knowledge of the laws and mechanism of radiation, it seems fair to expect great progress toward the protection of any element from any other and of any electric waves to others of any desired frequency.

The knowledge of critical frequencies and critical voltages is rapidly becoming more definite. This will give the physicist and the chemist the means of initiating and controlling chemical reactions otherwise impossible of human control The duplication of the chlorophyllian reaction by means of ultraviolet radiation is a significant experiment forecasting great achievements. That sugar can be made directly by photosynthesis from moisture and carbon and ultraviolet radiation seems incredible, yet this is credibly reported by Berthellot. In fact, Perrin and others suggested that all chemical action is by means of radiation, and that without the proper radiation, a chemical reaction is impossible.

Atomic Structure and Theories. That action should be found atomic was quite unsuspected and is still inexplicable; that the least common multiple or cosmic unit of action should be measured to within one part in six thousand and take a dominant place in the computation of atomic structure and spectra as well as in other branches of physics brings us to the point where we are almost ready to say that we have reached at least the ultimate units of matter and energy and action in the broadest sense Expressed in energy units based on the second, gram, and second, the numerical value of Planck's universal constant of action is 6.555×10^{-27} erg seconds.

Recent physics has witnessed the "electrification" of the atoms, and such properties as tensile strength and resistance to compression, which have been called "mechanical" must be regarded as electrical. Tensile strength is the attraction between ions, resistance to compression is the repulsion of like charges or like poles of magnets. The structure of the atom now disclosed gives a vivid picture of the mechanism and mode of operation of the "properties of materials."

Now that energy is known to have momentum and inertia, we are free to revive the *energetik* of Ostwald, and with Le Bon and Einstein conceive nature as a phenomenon rather than a thing and to regard atoms as systems of energy rather than dead inert matter swept by chance forces into fortuitous concourse called material systems. Nor is this new *energetik* a mere idea, we can measure the increase in mass with velocity, witness the transformation of energy into mass and mass into energy, and can compute the energy equivalent of mass of any element. If mass is all energy, then a gram of any kind of matter has as its energy equivalent 90,000,000,000 ergs of energy, that is the mass multiplied by the square of the velocity of light.

Radiation and Pressure. That the mass of radiation which causes its pressure is not a

mere abstraction of academic interest only, is seen in the theory of giant stars and the powerful rôle which radiation pressure plays in the architecture of stellar evolution and especially in limiting the growth of mass to approximately 10^{35} grams, the mass at which radiation pressure begins to far exceed the inward pull of gravitation. Practically all the stars are between 10^{33} and 10^{34} grams, where ether pressure of the soft X-rays just begins to dominate the situation. Knowing the mass, it becomes possible to compute the highest temperature through which an old star has passed, and knowing its size also, it becomes possible to tell what stage of its evolution it has reached.

In the days of Laplace gravitation was assumed as the only building force of the cosmos. His famous nebular hypothesis received overwhelming support by the discovery during the past 50 years of the spiral nebulas numbering perhaps millions About the middle of the past century the pressure of light was postulated from theory, and later confirmed. In the heart of a star the pressure of light is now known to sustain most of the vast weight of the star's mass.

During the eclipse of 1922 it was found that the sun's atmosphere was being driven away from the sun with a speed that increased steadily. Such an increase could only be due to an accelerating force constantly at work. This force was promptly recognized as light pressure. The same effect was observed when Halley's comet was seen to disrupt, a small portion of the head breaking off. The lower momentum and smaller size of the detached particles caused them to be driven away from the sun relatively to the head of the comet. Gravitation and the pressure of radiation are now recognized as jointly determining the architecture of stars and stellar systems.

Nothing in the history of science compares with the sensational attack upon the problem of the structure of the atom and the amazing results which have been obtained during the past few years. They open up a new universe, infinitely small, within the atom—yet coextensive with the great universe about us. Mendeléev, Shenstone, and others had imagined an infra-cosmos in which atoms were planets and molecules were stellar systems. The atom is, in fact, now known to be a solar system, the smallest constituent of which is perhaps a trillion times the volume of the entire atom. The hydrogen atom, the simplest of all, was quite naturally the first studied, and as suggested by Prout it turns out to be the unit of which all later atoms are built. This atom is one ultimate unit of positive electricity around which circles one unit of negative electricity. As early as 1881, Stoney and Helmholtz had independently suggested that electricity was atomic in structure. Stoney had already named the atoms electrons.

Development of Atomic Theory. Hundreds of notable names suggest themselves as playing parts in the steady stream of atomic knowledge which formed the atomic theory as it appears in 1924. Faraday discovered the law of electrolysis, Berzelius had developed his electrochemical theory, and Arrhenius the theory of electrolytic dissociation. Then came Lenard, J. J. Thomson, Crookes, and others concerned in disclosing the electron itself as a discrete entity. Curie brought radium to light from which electrons and helium nuclei were ejected and gave a dynamic example to the physicist of of disintegrating atoms. Soddy advanced the thought, foreshadowed by Crookes, that the atoms might vary in weight even for the same element and examples were afforded in radioactive transformations. Variant weight atoms of the same element were called isotopes. Thomson and Aston perfected the means of studying them and the latter provided proof that the atoms, except hydrogen, had integral atomic weights.

At this juncture Planck's quantum theory became in 1900 an essential factor in the field of radiation. Balmer, Rydberg, and Rits had given an equation for computing the spectral lines of the Balmer series. The outstanding question remained: why were special favored frequencies alone possible, say, in the Balmer series of hydrogen? On classical assumptions and electrodynamic theory no explanation was forthcoming.

Planck found complete agreement on the assumption that the energy of the vibrating electrons could not change continuously but always in whole numbers of what he called "energy-quanta." Thus Planck's constant took its place as the factor which multiplied by the frequency gave the energy quantum. This latter relation was pointed out by Einstein who based upon it his theory of the photoelectric effect. Not yet, however, was it possible to reconcile interference phenomena with the theory of quanta, and it is just such phenomena that reveal the meaning of the frequency thus computed. Bjerrum's prediction, verified by Eva von Bahr, that rise in temperature would cause spectrum lines to split up into discrete components became a vivid proof of the reality of the quantum.

Then came Rutherford's development of Rankine's suggestion and Nagaoka's theory that the nucleus of the atom would be found to be positive, since the electrons were negative. We can fairly attribute the establishment of this fact to Rutherford in the year 1911.

Bohr's Theory. Two years later, in 1913, a young physicist at Copenhagen, Niels Bohr, attempted the final step of postulating certain conditions which might account for the stability of atomic structure and the properties of radiation from the atoms in accordance with the observed relations. The essence of this is that certain favored orbits alone could exist and that these bore such relation to each other that the radii are proportional to whole numbers. For simplicity suppose these represented by circles. The favored series within which alone stability existed were circles having radii 1^2, 2^2, 3^2 . . . n^2. An electron might jump only by whole number intervals. No radiation takes place while an electron is moving in one of these orbits. If an electron jumps from one of these to another, the difference in energy is equal to Planck's constant times the frequency.

Bohr's two postulates gave a basis for the stability of the atom, and for the discrete frequencies which we call spectral lines. A second step assumed that these discrete orbits were radial quanta and that there existed also ellipses of azimuthal quanta, both of which together determined the size and shape of the orbit of the electron.

Bohr borrowed from astronomy the concepts of orbits. He showed that for hydrogen the spectral series (Balmer, for example) could be

computed from theory assuming Coulomb's law and the discrete stable orbits (nonradiating). For example, the hydrogen alpha line of the Balmer series of hydrogen represents a release of energy equal to the difference between the energies of the 3d orbit and the 2d orbit having equivalent radii respectively 3^2 and 2^2, or ellipses of similar energy content.

The characteristic of the Balmer series is that the orbit of arrival is No. 2, the orbits of departure being respectively 3, 4, 5, 6, . . . n . . . theoretically on to infinity Naturally the electron fall from infinity to orbit No. 2 would give the maximum energy release—just equal to the ionization potential. The latter is the voltage required to give electron speeds sufficient to drive an electron from an atom permanently. The ionization potential becomes one of the great basic constants affecting not only spectroscopic theory but all chemical reactions as well. If the ionization potential is divided by the Planck's constant (6.555×10^{-27} ergs) the result is the frequency of the shortest wave emitted by the atom in the Balmer series. Such very simply was Bohr's theory. It has had many brilliant confirmations, notably the work of Sommerfeld in accounting for the fine structure of the spectral lines, in 1916.

In 1914, Lyman discovered the series in which the orbit of arrival was Orbit No. 1. Paschen had long before found the spectral series for which the Orbit No. 3 was the orbit of arrival. In 1922, Brackett observed several lines of the series terminating in the fourth orbit The simplicity of the theory may be stated thus: all emitted or absorbed radiation is produced by change of orbit. For hydrogen the difference of the inverse squares of the orbit numbers gives the ratio of their frequencies. A falling electron emits, a departing one absorbs energy. The mathematical treatment of the hydrogen orbits is now relatively simple. Such treatment of the helium orbits is still impossible, except for special cases of assumed structure. The problem of three bodies (hitherto insoluble) now assumes great importance in the further study of the atom and its spectra.

At this writing (1924) the outstanding achievement in this field is the closing of the gap in the entire electric wave spectrum by E. L. Nichols. Thus the shortest gamma ray and the longest used in radio are united into a single series constituting the electric wave spectrum and comprising the gamma rays, X rays, heat, light, and radio—all separately named as their unity had not been proved until recent years. To-day the unity of the electric waves from 2×10^{-10} cm. to the maximum radio waves is as complete as the periodic system with the difference that while the properties of all the elements are known, five are still missing from the series of 92 believed to be possible under observed conditions.

Spectra. The spectra, then, become a means of studying the energy and structure of the atom. The emission spectra are of various kinds which it is not the purpose here to discuss except to say that the eccentricities of the elliptical orbits appear to give rise to the so-called principal, diffuse, sharp, and fundamental series in conjunction with the Lyman, Balmer, Paschen, and Brackett series referred to above.

The complexity of the later elements of the periodic system gives rise to corresponding complexity in their spectra. A method of approach has been devised by the determination of spectral terms on the theory now established that each spectral line represents the difference of two spectral terms in accordance with the quantum theory and the Einstein relation $E = h\nu$, whence $E - E' = h\nu'$. The work of Catalan, Meggers, Walters, Kiess, and others carries the analysis of the spectral frequency relations into the most difficult elements of the periodic system, even including the most complex spectrum, that of iron. The similarity to the hydrogen spectrum is shown in that the terms in each series may be given by the expression $K/(n-a)^2$, K being the same constant used in the case of hydrogen, n the term number, and a, a special constant for each series.

Bohr then regards the above relationship as ground for viewing spectra as "the last step of a process whereby the neutral atom is built up by the capture and binding of electrons to the nucleus, one by one." Spark spectra are now known to be due to ionized atoms and represent the last step but one in the formation of the neutral atom by the successive capture and binding of electrons, the usual arc spectra representing the last step. We have thus the basis of studying the evolution of the periodic system of the elements—a field which at this writing is one of intense interest and activity.

The impact of electrons at controlled speeds has become a means of throwing light on the energy required to change the state of energy of the atom and experimentally checking up the magnitude of the spectral terms. Frank, Foote, Mohler, and others have done notable work in this direction, as related in Foote and Mohler's brilliant work *The Origin of Spectra*

In 1914, Stark discovered a remarkable splitting up of the hydrogen lines when subjected to an electric field. Two years later Schwarzschild and Epstein both succeeded in accounting for this effect, and in 1917 Sommerfeld and Debye worked out the explanation and details of the Zeeman effect on the basis of Bohr's theory of atomic orbits. In 1922, Stern and Gerlach split a stream of atomic silver into two parts, showing that the single outer electron in its rotation makes each atom an electromagnet, and when passing a sharp-edged magnet repelled like or attracted unlike polarities, making two streaks as graphic demonstrations of the Bohr theory.

These three astonishing confirmatory achievements combined with that of Sommerfeld account for the fine structure of spectral lines on the basis of the relativity effects in the elliptical orbits of departure and arrival. The computed and observed Stark effects on the hydrogen gamma line (for example) are in striking accord both as to position of the components and their relative intensities, both of which facts are confirmatory of Bohr's theory of interorbital transitions of electrons. Kramer has given the details from the standpoint of the Bohr theory.

Bohr himself, on the basis of spectra and other considerations, has published a summary of the electronic distributions on each atom of the periodic system. J. J. Thomson (in 1904) had suggested that the electrons are arranged in groups concentrically, each new group representing a new period of the periodic system. Kossel (1910) developed the idea, and G. N. Lewis and I. Langmuir, basing their speculation on the possible cubic outer grouping of Column VIII atoms of the inert gas group, postulated

statical equilibria of the tetrahedral atoms of Column IV with the electrons at the corners of the tetrahedron.

Valency on this view became the number lacking to complete the cubic configuration. The general applications and extensions of this view are now available in some of the general texts and will not be recited here. The situation in 1924 was remarkable. The curve showing the relation of square roots of the spectral terms has been studied intensively by Siggbahn, who continued the fundamental researches of Moseley. The astonishing linearity of the X-radiation of the *K* and *L* orders enabled the prediction of the existence of Atom No. 72, and its subsequent discovery in zirconium, titanium ores, and later its isolation in quantity. This new element was named by its discoverers "Hafnium" after the ancient name for Copenhagen "Copenhafn." The workers in the atomic field are many, and the detailed works are found in every physical journal, for the subject in 1924 had become the outstanding problem of science, full of promise for discoveries of the most important and probably epochmaking kinds.

Whittaker pointed out a possible model of the atom capable of unreversed action upon a moving electron passing towards and through an atom and which demands all exchanges between the kinetic energy of electrons and radiant energy to conform to the Planck quantum equations. The electrons in each atom comprise two groups or magnetic systems, the inner has moment and may turn in an applied field, the outer fixed relatively to neighboring atoms takes its proper place in the space-lattice of the crystal. As an example, Ewing made a model with eight fixed magnets pointing along the diagonals of a cube, their centres being at the corners of the cube. An approaching electron may be turned back (inelastic collision) since a rotating magnet takes up its force and causes it to recede giving back the energy as the rotating magnet is again brought to rest. If moving with sufficient speed or energy the electron will move clear through the atom but its energy is transferred to the excess over the critical amount, i.e. the quantum. The iron atom may thus be assumed as having 2 *K* electrons surrounded by three concentric parallel cubes, an electron at all corners of three cubes, making 26 electrons in all corresponding to atomic number 26.

Industry begins to recognize the utility of fundamental physics. A striking example is the recent progress in the study of the metals by means of the new atomic theory and X-ray analysis. These have revealed that the crystal of a metal consists of atoms arranged as regularly as the spacing on a checkerboard. For the more complex sizes and shapes of atoms the forces naturally cause characteristic space-lattices. If this lattice is made up, as in an alloy, the solute atom causes some distortion. Rosenheim has advanced the theory of "the substitution of the solute atoms for an equal number of the solvent atoms in a solid-solution lattice." The fertility of this conception can only be suggested, but its basis in fundamental physics gives promise of a new study of the structure of alloys which hitherto has almost resisted attack.

One outstanding aspect of the new physics is that "properties" are becoming based upon "ultimate" units—electrons, the electric field, Planck's constant, definite radiation frequencies, critical potentials, the velocity of light. Upon the basis of these, physics has begun the synthesis of physical forms which we call material bodies. With great rapidity the space-lattice is being determined by observation with X-rays, and in turn being computed from the constants of the electronic charge. It is not too much to say that this method of approach has given the new physics as nearly a fundamental or ultimate basis as we could without present knowledge conceive. The conviction is deep and insistent that physical science is fast converging upon the complete control of matter and energy which will give the physical basis for a new social order.

Harkins gives a periodic system of the elements based on the *H* and *Hc* atoms as units in building up the positive nuclei. Elements of even atomic number (carbon, oxygen, neon, magnesium, silicon, sulphur, argon, calcium, scandium, chromium, iron) all have atomic weights divisible by 4 (the atomic weight of helium) The positive nucleus of helium is the most stable next to the hydrogen nucleus, hence is well fitted as a stable building unit for more complex atoms. Almost direct dynamic confirmation that helium is such a building unit is found at the other end of the periodic table in uranium (atomic number 92) which disintegrates by losing one alpha particle.

Radium and its successors also progressively disintegrate by ejecting helium atoms, reducing from time to time the atomic weight by 4 with each ejection. So much for elements of even atomic numbers. Elements of odd atomic numbers, according to Harkins, are probably compounds of helium and hydrogen, computable by a simple formula. The even-numbered elements are, however, naturally more stable, as evidenced by the fact that 10 elements of even atomic number make up over 97 per cent of the meteorites and that the atoms of the even-numbered (helium) series are 127 times more abundant in the iron meteorites than the atoms of the odd-numbered (helium-hydrogen) series.

An event of truly stragetic importance in physics was Rutherford's success in breaking down the positive nucleus of the lighter atoms. Using the alpha particle (helium) from radium *C*, Rutherford had a projectile with a velocity of 19,000 kilometers per second; 20,000 times that of a rifle bullet. He had available in a single particle a stress-producing energy of 5 kilograms of weight at the closest approach to the nuclei encountered. The momentum at the high velocities is such that a gram of helium at such velocity would have a striking energy equal to that of a 300-ton projectile at a velocity of a kilometer a second.

With this projectile he bombarded hydrogen atoms, and in a relatively few of the total encounters between the alpha particle and the hydrogen atom, a head-on collision occurred, in which the momentum of the former was transferred to the latter, giving it a range four times that of the alpha particle. This was quite in accordance with theory. Unexpectedly, however, he found that in pure nitrogen the particle produced ranges as long as those produced in pure hydrogen. As the nitrogen atom has several times the weight of the helium atom, by control experiments he eliminated all explanations except that the nucleus of the ni-

trogen atom had been broken up by the swift alpha particle and a hydrogen nucleus detached from the nitrogen nucleus. The latter presumably consists of three helium and two hydrogen atoms (making the total atomic weight 14, that of nitrogen).

The long range atoms were detected by absorbing screens of metal which stopped the alpha particles but permitted the higher speed hydrogen atoms to pass to the scintillating screen. In any case, a new method of research has met with success and for the first time the positive nucleus has by intent and under control broken up. Other light atoms have yielded to similar bombardment.

Soddy has published a series of interesting papers summarizing the transmutation in radioactive changes, the disintegration of radioactive material, ultimate products, radiations, average life, branch series, chemically nonseparable elements. He concludes that radioactive changes are quite distinct from the usual chemical changes.

Chemical reactions are accelerated by rise in temperature, being doubled in rate for each 10 degrees rise. The reaction would thus be 10,000,000,000 times faster for each elevation of 300 degrees But the radium disintegration remains absolutely unaffected by such change. Heat, light, magnetic field, high concentration, or extreme dilution produce no effect on the rate of radioactive disintegration The particle is ejected with prodigious speed, 20,000 kilometers per second, from the radioactive atom. This is the helium nucleus (mass 4) but niton, the resulting product, recoils with a velocity of several hundred kilometers per second. The alpha particle passes 100,000 aluminium atoms before it is stopped. The initial energy of such a projectile is more than 100,000,000 times greater than that of a molecule in ordinary thermal agitation. Individual energy of a particle is 10^{-5} erg.

It is characteristic that unsuspected indicators of phenomena are found in this interchange of scientific thought Estimates of the age of the earth are based upon the atomic lead and its percentage in uranium ores. Knowing the rate per year at which the lead is accumulating from the final stage in the disintegration of uranium atoms, the age of the ore is readily computed. The figures check with good concordance with the age of the earth (forming of the ocean beds) as estimated by six other methods. Apart from its unique interest, the method is capable of effective use in geological theory.

Astronomy and Physics. Astronomy in turn has gained as well as given in its contact with physics. Belot holds that of the forces which dominate attraction in the architecture of the universe, gravitation blends all into one mass. The dispersive forces prevent agglomeration, such as molecular attraction, gas pressure, radiation pressure, electrical and electromagnetic forces. Crystalline growth operates against gravity as do many other forces of growth, but attraction does not produce the primitive dispersive impulse. Attraction ensures stability but the architecture is the resultant of all the incident forces.

A large-scale example of light pressure observed by Bell is shown in Saturn's rings. These rings are thin strata of bodies of meteoric size, surrounded and permeated by dust invisible except through deep layers. This dust is wind driven by gravitational waves and the pressure of radiation which moves the particles back and forth through the sunlit side to be seen below when light filters through. The acceleration due to solar radiation is, for particles of micron size, nearly 350 kilometers a day, a demonstration of Maxwell's theorem on a colossal scale. According to modern physics the mass of all stars rests upon radiation pressure. For example, 95 per cent of the mass of sun is supported by the radiation pressure of the intense X-rays generated in the heart of the sun under gigantic gravitational pressures. See ASTRONOMY.

Solar Physics. Solar physics is the object of particular study among other things, on account of the correlation which Abbott and others are establishing between solar variations and terrestrial meteorological phenomena. Angenheister finds the sun hotter at sunspot maxima. These show strong vertical movements, cooler layers sinking, hot masses rising, increasing the radiation. Jupiter and Encke's comet varies in brightness with the sunspot cycle, the maxima coinciding. Evidently factors other than temperature at spot maxima cause the striking 11-year cycle in tree ring growth. Mean air temperatures are at least one-half degree lower at spot maxima. The influx of cool air from higher latitudes is greatest at spot maxima, as shown by the records of the winds at Samoa. Trade winds at that point appear to be 10 per cent more frequent. The frequency of cirrus clouds also parallels the spot cycle. The air at spot maxima absorbs 0.05 calorie per square centimeter less per minute and the mean temperature of the earth drops a fraction of a degree. Abbott, Fowle, and Aldrich give 1.94 calories per square centimeter per minute as the solar constant, based on 20 years' observations.

The work of Douglas and others in correlating the variation in growth of the annual rings in trees with the sunspot cycle has been an outstanding achievement of recent science. So well advanced is this correlation that the particular years in which a tree was planted and cut down can often be deciphered from the characteristic pattern of the curves of ring growth sequence. Petrified forests may yet disclose prehistoric weather cycles and tell much regarding solar radiation in geologic times. The subject is fascinating. Every lumber camp becomes a potential solar and terrestrial weather observatory, and every tree has its tale to tell of the sequence of weather changes through which it grew. Douglas describes observations of cloud formations taken from an airplane including record of temperature within the cloud and the surrounding air and the dimensions of the cloud formation. A new field is now open for airplane work in collecting data with suitable autographic instruments.

Jeffreys accepts the tidal theory of the origin of the solar system, showing that mere condensation could not produce the system. His results agree well with the age of the earth as determined by its radioactive constituents. He also shows that no satellite less than 1000 kilometers could have been gaseous since the mass could not hold itself together in gaseous form. He assumes that the asteroids were formed from a primitive planet broken up by the tidal action of Jupiter.

Michelson has obtained the first measure of the diameter of a star—alpha Orionis—the bright red star Betelgeuse of magnitude 0.7 in the constellation of Orion The result is startling, for it gives a diameter 300 times that of the sun, or a volume 27,000,000 greater. He later found that alpha Scorpionis—Antares—had a diameter 500 times that of the sun or a volume 125,000,000 times greater. The principle is to admit the starlight by two parallel slits in the field of the telescope. The diffraction pattern formed depends upon the distance apart of the slits. For each size of star disc there is a definite distance apart for the discs at which the diffraction pattern disappears owing to the optical interference effect in the waves forming the two sets of diffraction fringes. By adjusting the slits until this occurs and measuring the distance apart, the angular diameter of the star disc is computed by simply multiplying the wave length used by 1.22 and dividing the distance apart of the slits.

A striking application of Bohr's theory comes from astronomy. Plaskett found in Class O stars spectral lines of ordinary hydrogen and of helium atoms which have lost an electron. These nuclei have only one satellite each. Bohr has computed the orbits and the positions of the spectral lines. The heavier helium nucleus changes the orbital frequency by the computed amount. From the separation of the lines the electrons and nuclei reveal their relative masses. Plaskett has found a star (22,000° C.) so hot that helium atoms are all ionized.

"Invisible sunspots" were studied by Hale and Ellerman. Beginning with the theory that the normal type is the "twin bipolar," 970 spots showed the percentage of bipolar spots to be 61 per cent. In seeking companions for single spots local magnetic fields were discovered near the spots. The first such field discovered had the polarity and position usual for the following component of a regular bipolar pair. In several cases, invisible fields gave rise to spots, and in cases where spots had disappeared traces of magnetic fields were still detected. If the vortexes of a bipolar group penetrate deep enough they must certainly unite to form a half ring.

Light Studies. Ives revives interest in the firefly, stating that if the light of the firefly were spread over the entire visible spectrum it would still excel many times the efficiency of any artificial light source. It will be recalled that Coblentz found the luminous equivalent of radiant energy as about 50 candles per watt. Colorimetry, for which physicists like Priest and others are laying basic principles, is fast taking a high place as an exact science.

Harvey has completed the first big step toward the production of artificial light from organic material. He obtained a candle power from 30 square inches of luminous solution of luciferine. Dubois and Harvey have extracted "luciferose and luciferine" two substances supposed to be the cause of animal light. Luciferine emits no light on agitation, but luciferose bursts into a momentary brilliancy if shaken. When mixed the two substances emit continuous light, apparently requiring oxygen or moisture.

Acoustics. Applied acoustics had great opportunities in the War. It was active notably in the production, transmission, and reproduction of sound, exemplified notably in the use of acoustical devices for detecting enemy planes, locating enemy batteries, and discovering sappers at work underground. Huge parabolas used as reflectors with sensitive sound receivers detected planes approaching Paris 30 miles away. Apparatus was promptly devised to locate enemy batteries with high precision. Sensitive geophones effectively disclosed enemy mining, and sound ranging was developed to a point where the length of the type of gun had to be taken into account so accurate was the location of enemy batteries by sound-wave triangulation. Battle firing permitted the study of sectors of sound, and speeds of concussive sounds were measured as high as three kilometers per second and pressures as great as 300 atmospheres. The gradient was so steep that 30 meters from the sound source the speed dropped to 400 meters and the pressure to two or three atmospheres.

Radio-Communication. The faintness of radiotelephone sounds even at moderate distances led to the development of amplifying electron tubes. The uses of electron tubes are unique in the annals of invention and are in a state of rapid development at this moment. Their design and construction command exacting theoretical and experimental physics. Research engineers have developed the amplifier which can magnify sounds trillions of times, in fact, to the point where their volume cannot be endured and where structural materials would collapse if the sound were continued. The microphone is now supersensitized and connected to an amplifier permits the human heart beat to be heard across the ocean.

Radio-communication has awakened research and invention the world over both by experts and amateurs. The Armstrong regenerative circuit is an example of amateur work of notable importance. Applied physics will be the factor in eliminating strays, static, distortions, and this result combined with the perfecting of amplifying tubes will bring a new era in radiotelephony.

Jewett reported that it was possible to transmit and amplify by radio without distortion. There remained the perfecting of the reproduction of sounds at the receiving end without distortion.

The application to the inaudible sounds of the insect world, too faint or of too high a frequency to be normally heard, opens up dramatic possibility of vastly extending aural perception much as the microscope and telescope and camera have extended our vision to the infinitesimal, the infinitely remote, and to the vast gamut of radiations which are too long or too short to be directly seen by the eye.

The study of "sound spectra" of musical instruments awakened an interest which should soon be fruitful in practical application. This analysis gives the respective wave lengths and relative intensities of the simple sounds component of any musical note revealing quantitatively the causes of the characteristic quality of the sounds of musical instruments.

Physics in 1924 had before it the task of studying the entire range of molar vibration frequencies and amplitudes. Such a study would unify molar waves in a manner similar to the just completed unification of electric waves. Ellerman's "hydrogen bombs" discovered in the solar spectrum give evidence of prodigious explosions in the sun. Volcanoes and earthquakes also give rise to vibrations which

shake the entire globe. From such vibrations to those too fine to be yet perceptible is a virgin field for acoustical research and experiment.

Rhythm and Resonance. Already at Munich the technical physicist is studying vibrations in connection with mechanism with a view to enhanced efficiency in the transmission and use of mechanical power. The possibilities of utilizing resonance are just beginning to be adumbrated. Every object, every cavity has its natural period or resonance wave form. Such form may be complex. In other cases the note may be simple. An archway, tradition tells us, may collapse under the continued playing of the keynote of the arch on an instrument like the violin. The rhythm of a regiment will vibrate a bridge to the breaking point The automobile at different speeds shows resonance at various points each characteristic of a given speed. So, too, vibrations are being applied for physical ailments.

As yet the entire field, from earthquakes to the as yet imperceptible oscillations of the insect world, are in an empirical, even legendary state. With the supermicrophone and amplifier the study of the sound spectrum of a given object or cavity set in vibration or resonance becomes possible. Any characteristic tone is thus reproducible by giving the harmonics their proper relative intensity. The field is thus wide open for the creation of a harmonic synthesizer capable of producing sounds of any possible tone quality or frequency.

Reproduction of Sound. Physical research has almost perfected the phonograph to the point where the distinction between the original rendering and the reproduction from the shellac disc is difficult. Astounding developments in this field have resulted from the application of acoustical physics, theoretical and experimental, to radio. The reproduction by means of a crystal is perfect but faint. The reproduction without the crystal still shows distortion and alone remains the incomplete link to the world-wide transmission of any sound, and its amplification without distortion to any volume. The field of acoustics has been furnished by physicists with precision tone producers, that is the production of clear monotone notes of a predetermined frequency.

Music. Seashore has measured the expression of emotion in music. He gives the types of variants from the cold non-emotional and mechanical production of tones to the highly artistic emotion on the basis of pitch, intensity, duration, and extensity, as they are combined in timbre, rhythm, consonance, and volume. The analysis is a behavioristic study of musical expression and should throw light on the basic laws of emotional expression.

Apparatus for Navigation. Acoustics has taken on new activities in such fields as submarine signaling. Eckhardt has devised a combination of submarine sound signals which are made to actuate a radio relay at several points on the shore. The radio relay signal reaches the ship almost instantly, the elapsed time giving the distance from each shore station. The relays give the exact location. The United States Navy by the use of echo detected by radio permits the sounding and the plotting of the ocean depths and the mapping of its profiles and contours. The "phonodeik" designed by Miller has opened up the subject of sound spectrum and given it a quantitative basis.

Modern Physical Science. The merging of the fields of astronomy, chemistry, and physics resulting from the invasion of physical laws, research methods, and the instruments of the physicist has been momentous for all three sciences. The extension of mathematical formulas into new fields is characteristic of present-day physics. Highly specialized formulas are found to hold good in fields foreign to those in which they were developed. Frank shows that the solution of the problem of guiding aircraft in minimum time with any arbitrary wind distribution involves an identical case to that of the passage of light rays through moving media. An example of the latter is the motion of the earth through the ether in which the ether wind relative to the earth is determinate by vector analysis. Aëronautics (q.v.) and aviation physics emerge as subjects of permanent interest, and meteorology (q.v.) has become of most practical concern in aviation so that wind speeds and directions at various levels are part of daily forecasts. The merging of hydrodynamics and aërodynamics is to be noted as a striking gain of recent work on hydroplanes and flying boats.

Physical Instruments. The new English *Journal of Scientific Instruments* is issued by the Institute of Physics in coöperation with the National Physical Laboratory. Science is recognizing the basic importance of instrument design and construction. Instruments make possible discoveries which could otherwise never be made. They accelerate, sometimes hundreds of times, the rate of gathering precise data. We may soon expect some physicist to do science the great service of writing a stimulating account of the place of the instrument in physics. This would doubtless inspire scientists and instrument makers alike in the production of new types of apparatus for experimental use. The *Journal of the Optical Society of America* has established an instrument section and added to its name the words "Scientific Instrument Review." Hitherto *Instrumentenkunde* has held the field unrivaled. America, now in the instrument field in full earnest, will surely take a high place in developing not merely new technical, but new scientific instruments as well, designed and built upon the most advanced scientific data and theory.

Precision Measurements. The use of interferometry in the production and testing of high precision shop gauges is an example in point, and on the horizon looms the "ultra-micrometer" of Wheddington and its improvement in America so that it will indicate lengths as slight as one billionth of an inch. Coblentz has greatly improved the sensitiveness of his star-heat apparatus which he expects will respond to the heat of a candle at a distance of 500 miles.

Extensometers of the most varied types and of high sensitivity have been developed. These are being applied to researches on materials and structures and the stress strain relations under loads. In optics the newer types of prisms are being applied to new uses, for example, the solid right angle prism, whose opposite face is an equilateral triangle, has interesting optical properties used in the War. The pentaprism and others are being applied in range finders while lenses, optical flats, and parallels are being developed in great variety for physical instruments.

Instrument making has at last arrived in

America, and American ingenuity is already in evidence in the later catalogues. Examples may be found in almost every branch of physics and applications in almost every branch of industry. In fact, the present tendency toward the completely measured control of industrial processes is almost without a parallel. Temperature and heat controls are now established in scores of industries. In many cases high temperatures are maintained automatically at predetermined values. The combustion of fuel is now automatically regulated in modern steam plants by means of apparatus which continuously and automatically corrects the admixture of air so that the CO content in the flue gases is kept at an optimum percentage.

These are examples of the instruments of the physicist becoming the tools of industry. Applied science is rapidly transferring the methods and principles and apparatus of the physicist into control instruments for the measured guidance of each part of the industrial process. In electricity the advance from the laboratory to practical uses has been rapid and steadily increasing. Electrical devices in endless variety are being developed for regulating the production, distribution, and utilization of heat, light, and power. Light buoys are being electrically equipped with selenium cells so that when the sky reaches a prescribed minimum brightness the buoy is lit automatically. Automatic heat control and humidity control are being extended to almost all kinds of manufacturing operations. The indoor atmosphere of schools and theatres is being conditioned by devices first used in the conduct of physical research.

Airplane engines are tested in altitude chambers where the conditions of high altitudes are duplicated. Testing laboratories are equipped with standard rooms having prescribed humidity and temperature so that the results may be comparable and standard. The vacuum tube has developed into a powerful engineering tool capable of sending messages to all parts of the world. In short, the variety of scientific devices developed by the physicist and transplanted to the industries is too great to enumerate The scientific journals and the latest instrument catalogues must be consulted for details which cannot be touched in this general survey.

A new era in astronomical research begins with the completion of the 100-inch reflecting telescope of the Mt. Wilson Solar Observatory. This wonderful instrument is uniquely adapted for work in the fields of faint nebula, spectra of faint stars, structure of stellar clusters, and the variation of faint new stars. The focal length, 42 feet, has a maximum error of 0.14 mm., or about one part in 90,000. The enlargement of the perceptible universe and the vast fields of research thus opened up by this 100-inch telescope make the event an epoch-making one.

Aëronautics Research. A most important and interesting development of applied physics in connection with lift, drift, and resistance of airfoils, is the midget wind tunnel consisting of a completely enclosed cylindrical tank with hemispherical ends. In this airtight tank, the air is drawn through an inner cylinder, returning outside the inner cylinder. By maintaining a pressure within the tunnel at 20 atmospheres, small-sized models give directly the results of a full-sized plane without scale corrections. This ingenious research shows the value of mathematical physics and the theory of similitude. At the other extreme of wind-tunnel physics is the giant wind tunnel at Issy, the fan of which is 20 feet in diameter. The tunnel measures 110 feet in length. The laws of aërodynamics have thus received accessions of an astonishing character, an important example being an American wind tunnel which gives air-speeds of 1000 miles an hour. In the latter the experts of the United States Bureau of Standards have studied the relative motion of the air and projectile with the projectile at rest.

As hydrodynamics and aërodynamics have merged in the hydroplane and the flying boat, so the internal-combustion motor may be fairly regarded as a large-calibre machine gun shooting the piston with a momentum which is promptly translated into traverse of aircraft. The problem of the helicopter is in like manner becoming assimilated to the circling of a plane with excellent prospects of yielding to ingenuity and careful application of physical principles.

Energetics. The importance of "available energy" is stressed by Lotka in a study of the energetics of evolution. He refers to Boltzmann's principle that the fundamental objective contention in the life struggle in the evolution of the organic world is available energy. The advantage in the struggle goes to those whose energy-capturing devices are most efficient in directing available energy into channels favorable to the preservation of the species. Intra-atomic energy, which is now well measured, and vast, is accepted by physics as a fact of profound significance for future experiment. Sober physicists discuss the possibility of its release for use by man.

The feeling seems to be growing that the reaction by which four hydrogen atoms detonate into one helium atom may be caused to proceed, and once started might be made continuous, much as the combustion of coal in a furnace. The weight of four gramatoms of hydrogen exceeds that of helium by three centigrams, corresponding according to the Einstein formula, to the liberation of 7×10^{12} calories. Harkins remarks that "the energy produced in this way would be of great importance if the reaction could be made to proceed, since one pound of hydrogen would give, if converted into helium, as much heat as 10,000 tons of coal." It is wise to face the possibility of success in this direction. Certainly with the concept of critical frequencies in photochemical reactions, the problem assumes the aspect rather of inciting exothermic combination of hydrogen molecules or atoms.

Foote, who has done so much valuable work on disrupting potentials, has discussed in a semi-popular lecture the subject of the alchemist. He pictures the success of the atomist transmuting the elements, pointing out that the production of gold from mercury on a commercial scale would cause an overturn of our entire monetary system. To the scientist, however, this is less important than the control of atomic structure in general. It is not easy to exaggerate the possible results of the discovery of the technique of nuclear formation and the addition or subtraction of electrons at will. It clearly presages the possibility of creating forms of matter and energy having any desired properties.

Wignall and Knox have written *Atoms*, a novel dealing with the release of subatomic en-

ergy, a straw showing the direction of current thought. The fact that subatomic releases of energy, for example, are actually observable in the phenomena of radioactive atoms and perhaps in the helium-hydrogen reactions of variable stars, kindles the scientific imagination. Young experimenters, who to-morrow will hold the field, have already grasped the possibilities and we may confidently expect a recrudescence of the zeal of the alchemist which made modern chemistry.

Physics was so productive in the 10-year period under review that only a few of the more important researches can even be named. It could be spoken of as almost the golden age of the physicist with the super forces and mechanisms at his command. The immediate future presages discoveries of the most far-reaching consequences. Fortunate is that physicist who sees with high and far vision the inspiriting view of the recreation of the world by the sciences touching the single cosmic essence which we call energy, the tangible aspect of which we call matter.

The literature on the new physics is growing so rapidly that any list would be out of date before reaching the reader. For the latest books in this prolific field the reader may consult the current numbers of *Science*, *Nature*, and *Science Progress*. See CHEMISTRY; CHEMISTRY, PHYSICAL.

PHYSIOLOGICAL CHEMISTRY. See BIOCHEMISTRY; FOOD AND NUTRITION.

PIAVE RIVER. See WAR IN EUROPE, *Italian Front*.

PICARDY, BATTLES IN. See WAR IN EUROPE, *Western Front*.

PICCIRILLI, ATTILIO (1868–). An Italian sculptor (see VOL. XVIII). He designed the war memorial for the city of Albany, 1923. He was awarded a gold medal at the Panama-Pacific Exposition in 1915, and the Widener Gold Medal, the Pennsylvania Academy of Fine Arts, 1917. His brother Furio (see VOL. XVIII) in 1920 executed the entire sculptural decoration of the Parliament House at Winnipeg, Canada, including a superb seated statue of Pierre Gautier de la Varenne

PICKETING. In 1914, the Congress of the United States passed the Clayton Act which, among other things, provided that no restraining order may be granted by any Federal court or judge to prohibit labor, singly or in concert, from peacefully persuading others to work or to stop work or from attending any place where they may lawfully be. Labor regarded this as the opening of a new era in which the right of peaceful picketing would become generally recognized and accepted.

Prior to 1914, there were laws in only two States—Alabama and Colorado—making picketing a misdemeanor. Beginning with 1915, however, several States took vigorous action. Washington enacted a law making picketing a misdemeanor. Texas followed with a sweeping Act which provided that any one who in conversation or otherwise with a person engaged in transport and commerce, or with any member of his family, at work or at home, attempts to cause him to desist from work through fear of violence is deemed guilty of intimidation. A Nebraska law made practically any form of picketing unlawful, including persistent communication with a man's family. Hawaii also enacted a strict law against picketing. Utah, in 1923, passed a law against use of force, threats, intimidation or violence but an earlier law of 1917, limiting injunctions, forbids any injunction from interfering with peaceful persuasion. Wisconsin, in 1923, liberalized a law against picketing, which involved initimidation, by specifically allowing peaceful persuasion to be carried on outside the working premises during the strike or lockout.

Meanwhile, picketing cases found their way frequently into the courts. In some States all picketing was condemned, as in Oregon and Washington decisions of 1917. In other States, the right of peaceful picketing was held to be lawful, as in Arizona, Indiana, Minnesota and Montana decisions of 1916 and 1917 However, not only in directly deciding against picketing but also in indirectly limiting its practice through definition, the courts have as a general thing "gone against labor."

In 1922, the United States Supreme Court, in American Steel Foundry v. Tri-City Central Trades Council, upheld the provisions of the Clayton Act permitting peaceful persuasion but attempted to draw the line between legal and illegal acts in a way that would considerably limit picketing.

The most sweeping blow that was struck at picketing during the decade was the injunction secured in 1922, and made permanent in 1923 by the Federal court in Chicago, against the Railway Shop Crafts strike. The Attorney General brought this action on behalf of the United States on the ground of protecting the United States mails and interstate commerce. Although the Clayton Act authorizes peaceful persuasion, nevertheless this injunction, in addition to the customary prohibition of violence, intimidation and unlawful picketing, restrains peaceful picketing and persuasion, argument and entreaties, newspaper interviews and the use of union funds "in aid of or to promote or encourage the doing of any of the matters or things hereinbefore restrained and enjoined." The terms of this injunction against picketing, however, drew vigorous criticisms in decisions of other Federal courts in cases arising out of the railway shopmen's strike, particularly in Montana and North Dakota, where the full right of peaceful persuasion was reaffirmed.

PICKFORD, MARY (MRS. DOUGLAS FAIRBANKS) (1893–). An American actress, born in Toronto. She made her stage début at the age of five and her first marked moving-picture success in *Hearts Adrift*. She returned to the stage in *A Good Little Devil* and then devoted herself to the screen. Among her successes are *Tess of the Storm Country*, *Cinderella*, *Fanchon-Cricket*, *Madame Butterfly*, *The Bishop's Carriage*, and *Rosita*. Shortly before the War and for the succeeding years she has been one of the most popular screen actresses in the United States.

PICK-MANGIAGALLI, RICCARDO (1882–). An Italian composer, born at Strakowitz, Bohemia. He was trained at the Milan Conservatory under Appiani (piano) and Ferroni (composition). His earliest works were written under the influence of Wagner and Strauss, especially in regard to the handling of the orchestra. Later the influence of the French impressionists makes itself felt. His most important works are the ballets, *Il Salice d'Oro* (Milan, 1914), *Il Carillon Magico* (ib., 1918;

New York, 1920), *Mahit* (ib., 1923), and *Sumitra;* a symphonic poem, *Sortilegi; Nortturno e Rondo Fantastico* and two preludes, for orchestra; a string quartet; and several pieces for piano. An opera, *Baci e Botte*, was completed in 1920 but was not yet produced in 1924.

PICRIC ACID EXPLOSIVES. See EXPLOSIVES

PIERCE, GEORGE WASHINGTON (1872–). An American physicist, born at Webberville, Texas, and educated at the University of Texas, Harvard and Leipzig. In 1903 he became instructor in physics at Harvard and in 1917 full professor of physics and director of the Cruft Laboratory. During the War he conducted experiments at the Naval Experimental Station at New London, Conn. Among his more important researches were those connected with his experiments in resonance in wireless telegraph circuits and crystal rectifiers for electric currents and electric oscillations. In addition to many papers contributed to various scientific publications he is author of *The Principles of Wireless Telegraphy* (1910) and *Electric Oscillations and Electric Waves* (1919).

PIGMENTS. See LEAD.

PIKE, FRANK HENRY (1876–). An American physiologist, born at Aurora, Ill. He was educated at the University of Indiana and at the University of Chicago. He was instructor in physiology (1907–11) at the University of Chicago and assistant professor of physiology (1911–16) and associate professor (1916–) at Columbia University. Professor Pike published numerous articles on general physiology, on the eyes of Cuban cave shrimps, and on heredity.

PILES. See FOUNDATIONS.

PILOT CABLE. See NAVIGATION.

PILSUDSKI, JOSEPH (?–). A Polish general and administrator, born in Lithuania, and educated at Kharkov University He became a socialist, and in 1885, because of a false accusation of complicity in an attempt to assassinate Alexander III, he was banished. In 1893 he returned to Poland and helped to found the Polish Society party. At the beginning of the War, Pilsudski secretly formed the "Polish military organization" which was used in the struggle to free Poland from Russia and the Central Powers. In 1916 he resigned from the Polish army because of trouble with the Austrian commanders and was later arrested by the Germans and imprisoned at Magdeburg. When he returned to Poland in 1918, he found the government very weak, and on November 14 the Council of Regency abdicated. Pilsudski, backed by his army, then held supreme power. During 1919, the year in which Paderewski became prime minister, Pilsudski was engaged in wars with the Ukrainians, the Czecho-Slovaks, and the Bolsheviks. The last, although they came within 12 miles of Warsaw, retreated in disorder in the face of a violent counteroffensive led by Pilsudski In 1919 he was elected to the office of president, which he held till December, 1922. See POLAND, *History.*

PILTDOWN MAN. See MAN, PREHISTORIC RACES OF.

PINCHOT, GIFFORD (1865–). An American forester and public official (see VOL. XVIII). In 1920 he was appointed Commissioner of Forestry of Pennsylvania. He was nominated for governor in May, 1922, by the Progressive wing of the Republican party in the State and was elected in the following November. He was inaugurated as governor in 1923. During the threatened anthracite coal miners' strike in 1923, Governor Pinchot drew up a plan of settlement which was accepted both by miners and employers During the early part of 1923 he took an aggressive stand in regard to prohibition enforcement and severely criticized President Coolidge and the administration for alleged laxity in the enforcement of the law. Later in that year he undertook to bring about an investigation of the prohibition enforcement bureau of the Treasury Department through a Senatorial committee which was engaged in investigating other activities of that Department He was defeated as delegate to the Republican National Convention in May, 1924.

PINE BLISTER RUST. See PLANTS, DISEASES OF.

PINE SHOOT MOTH. See ENTOMOLOGY, ECONOMIC.

PINK BOLLWORM. See ENTOMOLOGY, ECONOMIC.

PINTNER, RUDOLF (1884–). An American psychologist, born at Lytham, England, and educated at the Edinburgh University and the University of Leipzig. In 1912 he removed to the United States and was for several years on the faculty of the Ohio State University. In 1921 he was professor of education at Teachers' College, Columbia University. He was the author of several books on psychology, including *The Picture Completion Test* (1917) and *A Mental Survey* (1918). He also translated several books on psychology

PIRANDELLO, LUIGI (1867–). An Italian author, born in Girgenti, well-known in the United States as a playwright. His *Six Characters in Search of an Author*, played in New York in 1922, provoked much warm comment. In this play he uses the most terrible of human emotions as his material and at the same time reveals æsthetic theories concerning the material of art He turns to life for his first inspiration, struggles in his works with the problem of personality, and strives to find the borderline between reality and fiction. His *Floriani's Wife* was played at the Greenwich Village Theatre in 1923 He is also the author of novels, among them *The Late Mattia Pascal.*

PIRQUET, FREIHERR CLEMENS, BARON VON (1874–). An Austrian pediatrist (see VOL. VXIII). During the War, von Pirquet devised a new notation for nutrition, intended to improve on the calory. The unit is termed the *ncm*, representing a cubic centimeter of mother's milk. He published *System der Ernährung* in 1917, with an addendum in 1920, devoted to this idea. In 1922 appeared in English *An Outline of the Pirquet System of Nutrition.*

PIRRIE, WILLIAM JAMES, first BARON (1847–1924). An Irish shipbuilder (see VOL. XVIII). During the War he was of valuable service to the British government as commercial adviser to Lord Derby, and in March, 1918, he was appointed Controller General of Merchant Shipping. When the North of Ireland was separated from the new Irish Free State, he was one of the first senators elected to the Parliament at Belfast (1922) Lord Pirrie was created a viscount in 1921 and died suddenly on May 7, 1924, on his way to New York City.

PISTOLS. See SMALL ARMS.

PITCHBLENDE. See RADIUM.

PITHECANTHROPUS ERECTUS. See ANTHROPOLOGY.

PITT, PERCY (1870–). An English conductor and composer, born in London. He studied under Reinecke and Jadassohn at the Leipzig Conservatory (1886–88) and under Rheinberger at the Akademie der Tonkunst in Munich. In 1896 he was appointed organist at Queen's Hall; in 1902, coach at Covent Garden; in 1906, assistant conductor; and after Messager's resignation (1907), principal conductor, a post which he filled until 1914. In 1920 he became principal conductor of the British National Opera Company. His works include a symphony; *Le Sang des Crépuscules,* symphonic poem; *Anactoria,* a symphonic poem for viola and orchestra; *Ballade,* for violin and orchestra; an overture, *The Taming of the Shrew; English Rhapsody, Oriental Rhapsody, Fêtes Galantes, Cinderella, Dance Rhythms, Coronation March,* for orchestra; incidental music to Phillips' *Paolo and Francesca,* Austin's *Flodden Field,* and Shakespeare's *Richard II; Hohenlinden,* ballad for male chorus and orchestra; *Sweyting the Saxon,* cantata; *Sakura,* ballet-pantomime; and chamber music, piano pieces and songs.

PITTMAN ACT. See SILVER.

PITTSBURGH. A city of Pennsylvania. The population increased from 533,905 in 1910 to 594,297 in 1920, to 625,915 by the estimate of the Bureau of the Census for 1924. The population of the metropolitan district of which Pittsburgh is the centre was 1,207,504 in 1924. The area of the city was increased by the annexation of Spring Garden in 1920 and Chartiers in 1921. In 1919 the city voted $21,996,000 for municipal improvements, as follows: highways, including the Boulevard of the Allies overlooking the Monongahela River, $9,579,000; subway, $6,000,000; parks and recreation grounds, $1,815,000; waterworks, $1,401,000; sewerage systems, $1,341,000; public health, safety, and charities, $1,110,000; highway bridges, $750,000. In 1919, a new bridge across the Allegheny River was designed to meet the requirements of the War Department and was completed in 1923. It comprised three steel arch-truss spans, 229 feet, 437 feet and 229 feet respectively in length. After investigation of the rapid transit conditions in Pittsburgh, the city transit commissioner in his report of 1917 recommended two projects. The first was to connect the South Side district with the East End, chiefly by elevated tracks, a distance of 7.28 miles, at an estimated cost of about $7,000,000; the second to connect the North Side with the East End, mostly by subway and tunnel at a cost of about $11,000,000. A twin tunnel, known as the Liberty Tunnels, 5700 feet long, extending under Mt. Washington and connecting the South Hills district with the business section of the city, was completed in 1923 at a cost of nearly $5,000,000. A zoning ordinance was passed in 1923. A bill passed by the State Legislature in 1923 authorized the appointment of a commission to study the creation of a metropolitan district in Allegheny County. The Schenley high school, accommodating 2000 pupils, was completed in 1916 at a cost of $1,500,000. Other large high school buildings recently completed were Langley high school, South Hills high school and Westinghouse high school. Peabody high school was greatly enlarged. The Carnegie Library grew from 418,698 volumes in 1914 to 536,975 volumes in 1924. A business-district branch was opened in the City-County Building in 1924 to accommodate the business section of the city. Pittsburgh manufactures annually products worth $2,500,000,000. Bank clearings rose from less than $3,000,000,000 in 1914 to $8,212,798,000 in 1923.

PITTSBURGH, UNIVERSITY OF. An institution at Pittsburgh, Pa., founded in 1787. With the exception of the war years, the university increased its enrollment with great rapidity between 1914 and 1922–23; from 2830 in the former year to 7786 in the latter. The faculty was increased during the same period from 329 to 585 members, and the library from 20,000 to 85,000 volumes. The income of the university also increased from $452,055 in 1914 to $1,437,333 in 1922–23. Alumni Hall was built through gifts of the alumni in 1920. John Gabbert Bowman, LL.D., succeeded Samuel Black McCormick, D.D., LL.D., as chancellor in 1921.

PIUS XI (ACHILLE RATTI), POPE (1857–). He was born in Desio, Italy, and studied at the diocesan seminaries and at the Lombard College of Rome, where he obtained a doctor's degree in theosophy, theology, and common law. He was ordained priest in 1879. From 1882 to 1888 he was professor of dogmatic theology and sacred eloquence in the seminary of his diocese. He afterward joined the staff of the Ambrosian Library, of which he became head in 1907. Four years later he was appointed assistant prefect of the Vatican Library and prefect in 1913. He was sent to Poland as Apostolic Visitor in 1918 and in the following year became Papal Nuncio. He was created Archbishop of Lepanto in 1919 and was transferred to the Archdiocese of Milan as Cardinal Archbishop in 1921. Following the death of Benedict XV, he was elected by the College of Cardinals as his successor and was crowned on Feb. 12, 1922.

PIZZETTI, ILDEBRANDO (1880–). An Italian composer, born at Parma, Italy. After receiving his first instruction from his father he entered the Parma Conservatory in 1895 and graduated with honors in 1901. In 1909–18 he taught composition at the Instituto Musicale in Florence, when he succeeded Tacchinardi as director. In 1924 he was called to succeed Gallignani as director of the Milan Conservatory. He wrote the operas, *Giulietta e Romeo, Le Cid,* and *Debora e Jaèle* (Milan, 1922); incidental music to Sophocles's *Edipo Rè* and d'Annunzio's *La Nave, Fedra,* and *La Pisanella;* a *Requiem* in memory of King Humbert; *Poema Emiliano; Overtura per una Farsa Tragica; Sinfonia del Fuoco; Lamento* for tenor and orchestra; a violin sonata, a 'cello sonata, and a string quartet; and piano pieces and songs. He also wrote many essays for various periodicals, a biography of Bellini (1916), and *Intermezzi Critichi* (1921).

PLAGUE. See BUBONIC PLAGUE; INFLUENZA.

PLANCK, MAX (1858–). A German physicist (see VOL. XVIII). He received the Nobel Prize for physics in 1919. His later publications include *Vorlesungen über Thermodynamik* (1921) and *Vorlesungen über die Theorie der Wärmestrahlung* (1921).

PLANETS. See ASTRONOMY.

PLANT BREEDING. See BOTANY.

PLANT PHYSIOLOGY. See BOTANY.

PLANT QUARANTINE. See ENTOMOLOGY, ECONOMIC.

PLANTS, DISEASES OF. An annual plant disease survey of the United States was initiated in 1917. This survey was authorized by Congress and was carried on by the United States Department of Agriculture in coöperation with agricultural colleges, experiment stations, and various specialists in plant diseases, and it brought to light many new diseases, as well as old parasites on new hosts. There was also much study of the causes of diseases of plants and of means for their control. Among the diseases of great economic importance reported in the United States were citrus canker (*Bacterium citri*), potato black wart (*Chrysophlyctis endobiotica*), white pine blister rust (*Peridermium strobi*), take-all of wheat (*Ophiobolus graminis*), and flag smut of wheat (*Urocystis tritici*), all of which were introduced from other countries. The losses attributed to plant diseases in the United States were very great. According to estimates made by the Plant Disease Survey the losses of a few of the leading crops in 1922 were: wheat, 72,100,000 bushels; barley, 9,054,000 bushels; oats, 68,880,000 bushels, corn, 173,760,000 bushels; apples, 46,019,000 bushels; peaches, 10,547,000 bushels; and cotton, 916,980 bales.

The chestnut blight due to *Endothia parasitica*, which made its appearance in the vicinity of New York City about 1904, was probably introduced from Asia. It spread with great rapidity, and at the end of 1923 practically all the native chestnut trees in New England, eastern New York, New Jersey, Pennsylvania and Maryland had been destroyed, and the disease was spreading toward the South and West. Sporadic outbreaks of the fungus were reported from West Virginia, North Carolina and South Carolina. Occasional trees escaped where the fungus was prevalent, and this led to the hope of establishing varieties resistant to the blight.

Citrus canker caused by *Bacterium citri* was discovered in Florida and other Gulf States in 1916. This disease was believed to have been introduced from Japan, where it does comparatively little damage except to navel oranges. In the Gulf States it soon became very destructive, especially to oranges and grapefruit. Congress appropriated more than $1,700,000 for studies of this disease and means for its control. This sum was supplemented by State and other contributions, and the work on control was carried on coöperatively with the States where the disease occurred. Florida was most severely affected and many thousands of trees were burned. As a result citrus canker appeared to have been eradicated from the State, for no new infestations were reported in 1923. The same disease was reported in South Africa, where similar methods of control were applied with gratifying success.

The Plant Disease Survey found the black wart disease of potatoes caused by *Chrysophlyctis endobiotica* in Pennsylvania in 1917. Later it was discovered in a few localities in Maryland and West Virginia. This disease is believed to have been brought from Europe, where it is considered a serious trouble. All the localities where it was found in the United States are mining communities which are not important producing centres. Strict quarantines were established about them, and by the growing of immune varieties of potatoes it was hoped that the disease might be stamped out.

The white pine blister rust continued to be a subject of much concern not only to plant pathologists but to important industries dependent on the white pine and related species for timber. The fungus, *Peridermium strobi*, which causes this disease, has a complex life cycle. It spends different phases of its existence on the white pine and on currants and gooseberries. This parasite, probably introduced from Europe on white pine seedlings, was first reported in the United States about 1906. All the five-needle pines and most species of currants and gooseberries are subject to attack. The blister rust occurs quite generally throughout parts of New England and southern Ontario, and in parts of Minnesota and Wisconsin, with scattered infections on either white pines or currants in New York, Pennsylvania and Michigan. It was reported in Washington and British Columbia in 1922.

The fungus cannot infect pine trees from other pines but must pass through its alternate hosts, wild or cultivated species of *Ribes*. Advantage has been taken of this fact and control measures are based on the destruction of all species of *Ribes* occurring in the vicinity of white pines, and in the northeastern part of the United States about one-third of the white pine area has been cleared of currants and gooseberries at a cost of only about $.30 an acre. This method of control appears entirely practicable, and the cost is insignificant as compared with the value of the white pine timber of the country.

Another disease of great agricultural importance, in the control of which some progress has been made, is the stem rust of wheat due to *Puccinia graminis*. The relation of this fungus to the common barberry has long been known, and in some European countries attempts have been made to control the rust on wheat by the destruction of barberries in the vicinity. About 1918 an active campaign was begun in the United States for the destruction of all common barberry bushes in a number of the leading wheat-producing States. Since then Congress appropriated nearly $2,000,000 toward the expense of eradicating barberries in 13 of the North Central States, the work being carried on coöperatively with State officers. The bushes were grubbed out of the ground or destroyed by the application of coarse salt or arsenates about them. In this way many millions of barberry bushes were destroyed in the hope that by the removal of one of the alternate hosts, epidemics of rust infection would be avoided. Whether this will be successful is problematical, for recently spores of the form capable of infecting wheat were caught in spore traps exposed on airplanes at 7000 feet elevation, indicating the possibility of infection from regions where the uredospores retain viability throughout the winter. In connection with studies of the wheat rust problem, varieties of wheat have been found that are immune to the stem rust, and reliance on them seems to offer a means of control.

The so-called virus or mosaic diseases of plants took on importance, not only on account of their wide distribution and destructive effect but through the various hypotheses presented regarding their origin. These diseases are characterized by a certain dwarfing of the plants,

abnormal coloring and blotching of the foliage, and in some cases marked changes in the form and texture of the leaves. A considerable number of important crop plants are subject to attacks of this character, among them sugar beets, sugar cane, maize, tobacco, tomatoes, potatoes, beans, etc. In the case of the potato the disease manifests itself in a number of ways that have given rise to special names, such as mosaic, leaf roll, crinkle, streak, spindling sprout, etc., all of which are probably manifestations of a single disease. They are also called degeneration diseases from their effect on subsequent generations of infected plants. On some plants there is a distinct yellowing of the foliage, as in the peach, or a mottling as in the leaves of sugar cane, corn, tobacco, beans, cucurbits, etc. In the sugar beet the disease causes a curling and mottling of the leaves which produces a condition known as curly top. The cause, or causes, of mosaic diseases were not definitely determined. By some investigators they were called virus diseases, since the causal agent readily passes through a porcelain filter and sound plants may be infected by the introduction of the filtrate into their tissues. Others considered them to be due to organisms so minute as to escape detection by the best microscopes. Still others claimed they were due to protozoan parasites, and a number of investigators, following Lafont, who was the first to find protozoa in living plants, reported the presence of flagellates and similar bodies in diseased tissues, and causal relations were attributed to them.

Nelson reported in 1922 the discovery of protozoa-like bodies in plants affected with mosaic diseases. The accuracy of the determination was questioned, but in 1923 McKinney and his coworkers reported the occurrence of intracellular bodies in wheat plants affected with mosaic which are claimed to be stages in the life of some organism. Iwanowski reported such bodies in 1903 but did not associate them with mosaic, and Palm in 1922 considered them as possible causes of tobacco mosaic. In 1924 Kunkel added further evidence to their probable causal relations. He considered that at certain stages they may pass through a filter. So far as was known, there had been no disease successfully produced with cultures of these organisms, with the possible exception of that reported by McWhorter, who claimed to have produced the Figi disease of sugar cane by the introduction of cultures of amœba.

The means by which mosaic diseases are transmitted from plant to plant are quite varied. Perhaps the most are distributed by insects, mostly aphids, which act as mechanical carriers of the infection, but in the case of curly top of sugar beets the infective material must remain for a definite period in the body of a leaf hopper, *Eutettix tenella*. Some of these diseases are not limited to a single host plant but pass readily to unrelated species. A number are known to winter over on perennial weeds and infect crops the next season. Some are carried from crop to crop in the seed, while in the potato some forms of mosaic are undoubtedly carried in the tubers used for planting. Avoiding the use of infected material for planting, the growing of resistant varieties, of which there are many, and combating the insects that act as carriers are the most hopeful methods of controlling mosaic diseases of plants.

The number of diseases of plants caused by bacteria greatly increased between 1914 and 1924. There were probably fifty species of bacteria known to cause such diseases, and as some of them are capable of infecting a large range of plants, the total number of affected species is considerable.

Bibliography. Among the important books descriptive of plant diseases and their control were: W. F. Bewley, *Diseases of Greenhouse Plants* (London, 1923); E. J. Butler, *Fungi and Diseases in Plants* (Calcutta, 1918); F. J. Chittenden, *The Garden Doctor: Plants in Health and Disease* (New York, 1920); G. Delacroix, *Maladies des Plantes Cultivées* (Paris, 1916); P. Graebner, *Lehrbuch der Nichtparasitaren Pflanzenkrankheiten* (Berlin, 1920); J. W. Harshberger, *Textbook of Mycology and Plant Pathology* (Philadelphia, 1917); L. Mangin, *Parasites Végétaux des Plantes Cultivées* (Paris, 1921); G. Massée, *Diseases of Cultivated Plants and Trees* (London, 1915); W. Nowell, *Diseases of Crop Plants in the Lesser Antilles* (London, 1923); W. H. Rankin, *Manual of Tree Diseases* (New York, 1918); E. F. Smith, *Introduction to Bacterial Diseases of Plants* (Philadelphia, 1920); F. L. Stevens and J. G. Hall, *Diseases of Economic Plants* (New York, 1921); J. J. Taubenhaus, *Diseases of Truck Crops and Their Control* (New York, 1918); J. J. Taubenhaus, *Diseases of Greenhouse Crops and Their Control* (New York, 1920); N. Vavilov, *Immunitet Rastenii k. Infektionnym Zabolievanniam* (Moscow, 1919); and H. Welten, *Pflanzenkrankheiten* (Leipzig, 1919).

PLATINUM. Inasmuch as Russia was the chief source of the world's supply of platinum previous to the War, it was inevitable that in the 10 years between 1914 and 1924 many changes should develop in the mining and refining of this essential metal, which already had become more valuable than gold, as well as in its marketing. In 1912, the world's production of platinum was estimated at 313,529 ounces, of which amount 300,000 ounces was credited to Russia. At this time Colombia, which was destined to become an important source of production during the decade, produced 12,000 ounces, while between 700 and 800 ounces of crude platinum were produced in New South Wales and Tasmania and in the United States respectively. In the period between 1914 and 1924, there was an increased demand for platinum in jewelry, and during the War for use in the chemical industries. As early as 1914, an embargo was placed on platinum in Russia, and from that time the production declined, dropping from 241,200 ounces in 1914 to 50,000 ounces in 1917, and to probably about 25,000 ounces in 1918. The effect of this shrinkage was to reduce the world's production in 1918 to 62,283 ounces, which probably marked the lowest ebb in the production of this valuable mineral.

With the decline in production in Russia there was an increase in the output from Colombia, which by 1917 had increased to about 30,000 ounces, and by 1923 was estimated at 40,000 ounces. In the United States, where crude platinum was obtained from California and Oregon, with small amounts from Alaska, 721 ounces were produced in 1912 and this by 1923 had increased to 1008 ounces, though in the following year there was a decline to 609 ounces,

of which Alaska produced 7, California 578 and Oregon 24 ounces.

Inasmuch as it was so essential as a war material, the United States in 1918 commandeered all available crude and refined platinum at a maximum price of $105 an ounce. This metal was very necessary for the various chemical industries that were active in the manufacture of explosives and other war munitions, and the government was able to accumulate adequate supplies. On Dec. 1, 1918, when the market was set free, and early in 1919, the government stocks were released. From that time on platinum underwent a series of violent fluctuations, being quoted at the end of 1919 at from $150 to $155 an ounce, while in the following year it reached a maximum monthly price of $154.23. In 1920, the price declined, and in the following year a minimum monthly average of $70.227 was recorded, from which there was a recovery so that in the year 1923 the average for the year was $116.537. The average prices from 1914 to 1923 are summarized in the table following:

AVERAGE MONTHLY PRICES OF PLATINUM, NEW YORK MARKET [a]

Year	Price	Year	Price
1914	$ 45 14	1919	$114.61
1915	47 13	1920	110.90 [b]
1916	83 40	1921	75 033 [c]
1917	102.82	1922	97.618
1918	105 95	1923	116 537

[a] From *Engineering and Mining Journal.*
[b] Maximum monthly average $154 23.
[c] Minimum monthly average $70 227

In the United States, the considerable consumption of platinum has to be met by extensive imports, though some is obtained from the refining of gold, copper and nickel ores (see accompanying tables).

NEW PLATINUM METALS RECOVERED BY REFINERS IN THE UNITED STATES, IN TROY OUNCES

Year	Platinum	Palladium	Iridium	Osmiridium	Others	Total
1919	40,220	3,807	401	402	279	45,109
1920	36,015	4,309	418	409	393	41,544
1921	51,791	2,686	286	581	1,026	56,370
1922	54,142	1,943	210	1,301	122	57 718
1923	46,780	1,934	280	787	16	49,797

SECONDARY PLATINUM METALS RECOVERED IN THE UNITED STATES, IN TROY OUNCES

Year	Platinum	Palladium	Iridium	Others	Total
1919	54,545	3,467	3,504		61,516
1920	51,255	3,100	3,355		57 710
1921	39,131	4,887	1,776	229	46 023
1922	40,062	4,193	1,937	496	46,688
1923	39,152	6,246	2,021	453	47,872

IMPORTS OF PLATINUM AND PLATINUM METALS INTO THE UNITED STATES

Metal	1922 Troy ounces	1922 Value	1923 Troy ounces	1923 Value
Platinum or crude platinum and unmanufactured products, ingots, sheets, wire, etc.	94,939	$7,790,898	86,417	$8,923,037
Platinum, manufactured products, vases, retorts, etc.	[a] 45	[b] 11,464	103	4,769
Iridium	1,899	298,567	1,611	276,539
Osmiridium	2,165	242,637	1,171	150,074
Osmium	1,012	81,231	1,462	117,144
Palladium	9,754	537,684	14,578	857,071
Rhodium	111	16,227	805	86,569
Ruthenium	100	4,839	487	21 492
Total	110,025	$8,983,547	106,637	$10,466,695

[a] Incomplete. Includes 18 ounces in vases, retorts, etc., valued at $2813, and 27 ounces in other products not specified, valued at $1916.
[b] Includes articles to the value of $6735 (quantity not given) imported under duty in 1922 prior to September 22.

PLATINUM METALS CONSUMED IN THE UNITED STATES AS REPORTED BY REFINERS, 1923, BY INDUSTRIES, IN TROY OUNCES

Industry	Platinum	Iridium	Palladium	Others	Total	Percentage of total
Chemical	8,637	190	485	266	9,578	5
Electrical	18,596	1,675	3,666		23,937	13
Dental	16,288	153	10,116		26,557	14
Jewelry	105,699	3,073	14,948	190	123,910	65
Miscellaneous	3,156	1,403	986	1,256	6,801	3
Total	152,376	6,494	30,201	1,712	190,783	100

PLATONISM. See PHILOSOPHY

PLATOON SCHOOL ORGANIZATION. See EDUCATION IN THE UNITED STATES.

PLAYGROUND AND RECREATION AS-

SOCIATION OF AMERICA. An organization founded in Washington, D. C. in 1906. Its work for the development and improvement of playgrounds and neighborhood recreation schools continued actively during the decade 1914–24 Through the employment department of the Association, many officials have been enabled to select workers of training and experience. During the War, the Association sent community organizers into each of the cities near the training camps to organize social and recreational life for the benefit of the soldiers in their free time. This was known as the War Camp Community Service, and over 400 community organizers were at work in it. As a result of these activities men in the service were given home hospitality, community singing, athletic activities, and automobile rides. Entertainment was provided through soldiers' and sailors' clubs in practically all the cities of the country. During 1919 the Association sent field workers to the communities desiring their services, to help plan the work and to secure municipal appropriations. There was also inaugurated in that year the National Physical Education Service to assist States in securing adequate compulsory physical education laws and to work for these laws. This work continued during 1920, and as a result legislation and appropriations were secured in many States and cities for recreational purposes Special effort was made in 1921 for the passage of a Federal physical education bill A continuation service, established in 1921 and continued in 1922 and 1923, proved itself of value by giving help and advice on recreation problems to many cities already having recreational systems. The ninth recreation congress was held in 1922 and was attended by over 600 delegates. The Community Service department assisted local community service committees in several cities in training representative groups of citizens who, in a volunteer committee or association, helped to build up neighborliness and community spirit. During 1923 the association aided approximately 200 communities by conducting summer playgrounds and municipal year-round systems through the service of its continuation field secretaries. It gave further service by helping to secure, in five States, home-rule bills giving cities power to establish year-round recreation systems. Many pamphlets, handbooks, and bulletins were issued Over 500 delegates attended the Tenth Recreation Congress held in Springfield, Ill. The 1924 recreation congress had its meeting October 16–21 at Atlantic City, N J The association publishes a monthly magazine entitled *The Playground.* As a result of the efforts of the organization, 32 States had physical education laws in 1923 The president in that year was Joseph Lee.

PLOWING. See FARM TRACTOR.

PLUMER OF MESSINES (HERBERT CHARLES ONSLOW PLUMER), first BARON, (1857–). A British soldier. He entered the army in 1876 and served in the Sudan and South Africa, where he commanded a corps of mounted rifles. He took part in the South African War from 1899 to 1902 and in the latter year was promoted to be major-general He became lieutenant-general in 1908 and held various important commands in 1914. In 1915 he was made commander of the 5th Army Corps in France and from 1915 to 1917 was commander of the 2d Army. He was promoted to general in 1916. From November, 1917, to March, 1918, he commanded the Italian Expeditionary Force, returning in the latter year to France to resume command of the 2d Army, which he held until the close of the War. After commanding the Army of the Rhone, he was appointed Governor of Malta in 1919. Later in the same year he was promoted to field marshal. He received many decorations from foreign governments

PLUNKETT, SIR HORACE CURZON (1854–). An Irish statesman (see VOL. XVIII). During the agitation in Ireland following the rebellion of 1916, he labored diligently to bring about an understanding with the British government. In 1917–18 he was chairman of the Irish Convention. In 1923 he visited the United States in the interests of the Irish Free State, and during his absence, his home was burned by an Irish republican mob. He wrote *A Better Way: An Appeal to Ulster not to Desert Ireland* (1914), and *Some Tendencies of Modern Medicine* (1918).

PNEUMONIA. The pandemic of influenza and pneumonia and the prevalence of measles among the recruits in the United States Army with the high incidence of bronchopneumonia as a sequel, brought home to the public the ravages which these secondary pneumonias may inflict upon the world Much of the death rate of bubonic plague is due to primary and secondary pneumonia and the latter is the principal agency of destruction in whooping cough. Aside from this group of diseases bronchopneumonia is chiefly a malady of the very young and very old. On account of the secondary and complicating nature of this type of pneumonia, it is impossible to direct any special preventive measures against it and owing to the great volatility of the infectious principle in influenza, whooping cough and measles, it is impossible to prevent their spread.

Ordinary seasonal pneumonia, which attacks the young and middle aged as well as the old, has been studied intensively in the Rockefeller Institute and it has been found that the fatal outcome is due largely to a specially deadly strain of the pneumococcus, while other strains have a considerably lower mortality or are more amenable to treatment.

In May, 1924, Dr L. D. Felton, working in a Harvard University laboratory under the auspices of the Metropolitan Life Insurance Company, announced the discovery of a serum, which had been freely tested in various types of pneumonia with an apparent reduction of mortality of from 25 to 50 per cent of those treated Unlike various similar announcements made from time to time, this one had the indorsement of several conservative pathologists and health officers. It is of special significance because such a serum can be applied in any pneumonia without awaiting a bacteriological diagnosis See also INFLUENZA

POINCARÉ, RAYMOND (1860–). A president of France (see VOL. XVIII). In August, 1914, at the outbreak of the War, President Poincaré, by a great speech appealing to the patriotism of the French lawmakers, brought about the formation of a political *union sacrée* which maintained the Viviani cabinet in power for several years, until accumulation of the country's misfortunes and discontent with the prosecution of the War overset it, and Viviani gave place to Briand. Poincaré

at all times urged vigorous prosecution of the war, and after the Armistice he insisted that there should be no relaxation of the terms of the Treaty of Versailles for Germany. To insure payment of reparations he caused the occupation by French troops of Germany's most important industrial area, the Ruhr. In 1920 his term of office as president expired, and in 1922 he was asked by President Millerand to form a cabinet. He held the post of premier until 1924, when he was succeeded by Herriot.

POINDEXTER, MILES (1868–). An American legislator and diplomat (see VOL. XVIII). He served in the United States Senate from Washington from 1911 to 1923 but was defeated for reëlection in 1922. In 1923 President Harding appointed him Ambassador to Peru.

POLAND. A European republic erected by the Treaty of Versailles in 1919. Poland has an area of 149,140 square miles, the principal sections being Congress Poland (formerly Russian Poland), Posen, Pomerania, Galicia, Upper Silesia and Vilna, and a population estimated at 29,845,714 in 1923, of which 65 per cent was engaged in agriculture, 14 per cent in mining, and the balance either in trade or other pursuits. As for religion, the population was preponderantly Roman Catholic, other religions being the Greek Catholic, Jewish, Russian Orthodox, and Protestant. The Polish language was spoken universally. The principal towns, with their population, are: Warsaw, 931,000; Lodz, 452,000; Lemberg, 219,000; Crakow, 182,000; Poznan, 170,000; and Vilna, 160,000. There were in 1924 six universities and two national polytechnical institutes in Poland, the principal universities being located in Warsaw, Crakow, Lemberg (Lwow), and Posen. The polytechnical institutes were located in Lemberg and Warsaw. After the War, Poland had about 10,000 public schools with an enrollment of about 2,000,000 students. In addition, the educational system included 623 high schools. There were also two academies of fine arts in Warsaw and Crakow.

Agriculture. Out of a total of 42,000,000 acres of arable land, 37,791,000 acres were under cultivation in 1923. The principal crops, based on a five-year pre-war average from 1909 to 1913, and for 1922 and 1923, are shown in the following table, with figures in thousands.

	Sowings Area in hectares			Crops Metric tons			1923 Per cent of pre-war	
	1909–13 average	1922	1923	1909–13 average	1922	1923	area	crop
Wheat	1,353	1,046	1,017	1,704	1,160	1,354	80	80
Rye	5,087	4,578	4,665	5,749	5,066	5,962	93	104
Bread grains	6,440	5,623	5,662	7,433	6,226	7,346	89	98
Barley	1,265	1,147	1,199	1,517	1,304	1,655	99	109
Oats	2,749	2,404	2,515	2,051	2,548	3,622	92	121
Potatoes	2,644	2,234	2,279	25,300	33,754	26,494	95	105
Sugar beets	178	109	136	4,828	2,671	2,577	76	54

Poland was self-sufficient in major food products, and exported considerable quantities of grain, potatoes, sugar, alcohol, and eggs. There were many large land holdings in the country, but these were gradually being broken up into small farms through the agrarian reform movement, and through force of necessity, brought about by high taxation. The live stock census for 1921 showed: horses, 3,201,166; cattle, 7,894,586; sheep, 2,178,216; hogs, 5,170,612. The rate of increase after 1921 was believed to be abnormally high, due to very cheap fodder and the reluctance of farmers to sell for depreciating currency. About 25 per cent of Polish territory was covered by forests, or approximately 25,000,000 acres. The biggest and finest forests were in the eastern part of Poland. There was also the famous Bialowiez reservation, which covers about 600,000 acres. The government itself owned several million acres of forest lands, with an approximate value of one-half billion dollars, which was more than the combined internal and external debt. There were also large forests in the Carpathian mountains, in some districts covering more than half of the total area. The principal varieties of trees found were oak, ash, pine, spruce, and pitch pine There were 3000 sawmills engaged in the lumber industry in 1914, and in 1923 this number had declined to 1243, with a capacity of 6,500,000 cubic meters annually.

Mining. Through the acquisition of Upper Silesia in 1922, Poland became the possessor of one of the richest mining sections of Europe and from an importer of coal became an exporter. The estimated reserve was put at 63,000,000,000 metric tons. Coal production for 1923 was 36,097,997 metric tons, and exports were 12,912,792 metric tons. Of iron ore, there was an estimated reserve of 300,000,000 tons of 27 to 32 per cent ore, located principally in Silesia. There were also large areas of zinc and lead in Polish Silesia, the country ranking sixth in the world production of these minerals. The principal salt mines were located in Galicia and the reserves of this commodity were considered inexhaustible.

Industry. The section of Poland formerly belonging to Russia was one of the principal manufacturing sections of that empire. The principal industries in approximate order were: textile, heavy iron and steel, petroleum refining, zinc, lumber, machinery, chemicals, sugar, glass, cement, leather, alcohol, paper, and starch. The city of Lodz was the centre of the textile industry, with an estimated annual capacity at normal operation of 80,347 tons of cotton yarn, 82,000 tons of wool yarn, 78,740 tons of cotton fabric, and 27,300 tons of wool fabrics. The metallurgical industry production for 1923 was: blast furnaces, 288,000 metric tons; steel works, 1,043,000 metric tons; rolling mills, 732,000 metric tons Poland was one of the principal petroleum-producing countries of Europe, the oil-bearing land being located in the province of Galicia. The industry fell off considerably after the War, refinery for 1923 being 603,190 tons. Total petroleum production for 1923 was 737,000 metric tons, as compared with 1,114,000 tons in 1914. Reserves of petroleum were

estimated at 200,000,000 tons, there being 1900 wells producing in 1923.

Communication. Poland possessed a very well-developed railway system, but due to the depreciation of the currency after the War, railway tariffs, not having been adjusted as exchange fell, were not maintained at their old standards. Nearly all lines are state-owned and operated. Total of standard trackage in Poland, 16,653 kilometers: locomotives, 4593; passenger cars, 11,733; freight cars, 129,722. The railroads were operated at a deficit during 1919–24, and for 1923 constituted the largest single item contributing to the total government deficits. Railroad tariffs were, later, put on a gold basis and their budget separated from the general government budget so that the country regarded improvements as imminent. Poland had practically no merchant marine and was dependent for port facilities upon the Free City of Danzig, on the Vistula. The vessel tonnage entering Danzig in 1922 was 1,414,000; cleared, 1,437,000. One-half of the total area of Poland is located in the drainage basin of the Vistula River, which is one of the most important waterways in Europe Rising in the Carpathian mountains, in the extreme south of Poland, this river flows through the great Polish plain and enters into the Baltic Sea. Approximately 650 miles in length, the Vistula drains over 75,000 square miles of territory. With but two exceptions, the larger cities of Poland were situated on the Vistula River and its tributaries. River transportation, however, fell off considerably after 1919. The water-power resources of Poland were very great. It was estimated that 1,000,000 horse power could be developed. Sixty per cent of this was in the province of Galicia. In 1922, Poland had 44,406 kilometers of telegraph line, and 166,744 kilometers of wire, and 34,000,000 messages were sent during the year. In 1922, there were 1363 telephone centrals, 58,103 kilometers of line, and 364,654 kilometers of wire.

Finance. Conditions of currency inflation, which prevailed in Poland from the date of the Armistice, reached their climax in 1923, leading at the close of the year to basic fiscal reforms, the most important of which was the placing on a gold equivalent basis of payments to the government of taxes and other public charges In addition, a new bank of issue was created, to be independent of the government, but in which the government was to be a minority stockholder. The new currency was to be gold backed and the unit was to be the zloty, the dollar equivalent being $0.193. On Mar. 20, 1924, the number of Polish paper marks in circulation was 522,000,000,000. This was being replaced by the new zloty currency as rapidly as circumstances would permit. The rate of exchange of the old Polish mark for the new currency was fixed at 1,800,000 marks for one zloty. The old Polish mark ceased to be legal tender on July 1, 1924, and was to be invalid for exchange for new currency after May 31, 1925. Currency depreciation, which first rose from government deficits, was accelerated by the loss of public confidence, causing the Polish mark to depreciate to 9,350,000 to the dollar in February, 1924, at which point the financial reforms already outlined caused it to become practically stabilized. The national indebtedness of Poland on Dec. 31, 1923, was: internal debt, interest bearing, 182,932,800,000 marks and 16,400,000 zloty, plus the non-interest bearing debt to State Loan Bank which, on Feb. 1, 1924, was 291,700,000,000,000, equivalent to 162,000,000 zloty at the rate of 1,800,000 marks to the zloty. The per capita internal debt was really 68 cents, and was said to be lowest in Europe. The foreign indebtedness of Poland consisted of the following loans: United States, $184,434,339 (principally for famine relief); Holland, 14,218,687 florins; Sweden, 935-805 cronen; Norway, 16,497,417 cronen; Great Britain, £4,530,818; Switzerland, 17,600 francs; Denmark, 359,849 cronen; France, 912,455,222 francs; Italy, 75,000,000 lire. These figures were as of Jan. 1, 1923 After that date there was a large military loan from France.

Commerce. Statistics on Polish foreign trade, prior to 1922, were not available and, even though they were, would not form a correct basis of comparison for data from that date on, due to the acquisition of Upper Silesia in that year, with its pronounced effect on the foreign trade of the country. The outstanding feature of the Polish foreign trade of 1923 was a 32 per cent increase in the value of imports and an 83 per cent increase in the value of exports, and the favorable balance of trade for the latter year, as compared with the adverse balance in 1922. By far the most important country in Polish foreign trade was Germany which, in 1923, furnished 43 per cent of total imports (1922, 37 per cent) and took 60 per cent (1922, 49 per cent) of exports. The United States was also an important factor in Polish import trade, due to cotton shipments, which in 1923 totaled 43,344 tons out of a total of 57,568 tons, valued at $30,000,000. The following table shows the value of Polish foreign trade for 1922 and 1923 by principal divisions.

POLISH FOREIGN TRADE

	Value—1000 gold francs				Quantity—metric tons			
	1922		1923		1922		1923	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
Live stock	784	2,475	1,736	1,520	[a] 4,192	[a] 181,322	[a] 9,800	[a] 213,063
Manufactures	367,096	341,413	515,990	432 670	339,661	694,288	385,558	722,254
Raw materials	327,431	155,900	366,651	421,608	3,488,993	7,016,027	2,386,772	14,947,717
Foodstuffs	118,504	88,333	157.410	107,526	230,350	387,356	246,209	425,976
Semi manufactures	30,586	66,923	74,634	232,186	25,168	1,006,018	175,621	1,502,242
Miscellaneous	183	107	53	76	39,279	5,659	.....	.....
Totals	841,584	655,151	1,116,474	1,195,586	4,123,451	9,109,348	3,194,160	17,648,189
Thousands of dollars	$163,005	$126,444	$215,479	$230,748				

[a] head.

Defense. Poland employed universal military service for all male adults. Active service in the army was for two years, which was to be followed by periods of service in the reserve forces of the country. There were nine military districts with headquarters at Warsaw,

Lublin, Kielce, Grodno, Posen, Pomerze, Crakow, Lemberg, and Lodz. The 1924 army, on a peace-strength basis, numbered 275,000 men. There were 30 divisions of infantry and 10 brigades of cavalry. The war-time strength of the army was put at over one million. The naval forces of Poland were very small, consisting of six small cruisers and gunboats, five monitors, and a number of smaller vessels which were used for police and customs service.

History. From the middle of the nineteenth century, after the ill-starred Polish Revolutions, Russia applied herself sedulously to the task of breaking the spirit of Polish nationalism. The policy of Russification not only implied insistence upon the use of the Russian language as well as movements against the Catholic Church, but, more insidiously, by the encouragement given the peasants and the Jews, it aimed at a division of sentiment in Poland itself. The peasants were emancipated in 1864 and were given a share of political power by the creation of the local communes. This strategy might have succeeded if Poland had remained an agricultural country; but the coming of the industrial revolution to the Russian provinces gave impetus to the growth among the new proletariat of a socialism strongly tinged with nationalism. In the Russian Duma, after 1905, this socialist opinion was strongly expressed, and though, in the next decade, the appearance of an anti-German propaganda split its forces, it continued down to the War to exert a powerful influence By 1914, of course, Russian or Congress Poland was not singleminded in its purposes Many Poles gravitated to Austria, some toward Germany, and some toward Russia, while a large number still clung to their nationalistic aspirations. In Galicia, i.e. Austrian Poland, the problem was a different one The Austrian government, always more lenient than its northern neighbor, sought to gain the adherence of the Poles by a policy of studied kindness Poles acquired a large representation in the Austrian Reichsrat, were permitted the use of their tongue in the schools and law courts, and were placed in control of the administration of Cracow and Lemberg universities. As land and local administration, as well as higher education in Galicia were largely in the hands of the Poles, the latter became the oppressors of the Jewish and Ruthenian (or Ukrainian) minorities, by whom they were most cordially disliked. After 1890, the Austrian government, pursuing its time-honored strategy of "divide and rule," gave more or less covert encouragement to Ruthenian nationalist agitation, with the result that no inconsiderable number of Galician Poles became Russophiles because of their hostility to Ruthenian nationalism, while others, conscious of their favored position in Galicia, remained pro-Austrian. In Prussian Poland a different development had created other sympathies. By 1870, the Poles here had entrenched themselves so firmly economically that a move on them virtually meant the uprooting of the life of the whole country. Many of the Poles in Posen and West Prussia, unlike their kinsmen in Russian Poland and Galicia, were the successful members of the middle class, and aided by money and power had created a strong nationalistic sentiment. Beginning with 1872, Bismarck's campaign of Germanization moved on two wings. By the programme known as the *Kulturkampf* he sought to suppress Polish culture through the persecution of the Catholic Church and the elimination of the Polish language, and by economic methods, i.e the settlement of German colonists in Poland and the purchase of Polish land, he aimed at breaking down the Polish supremacy. Neither move succeeded. The Poles thrived in spite of official animosity and through the agencies of coöperative societies and political and social clubs maintained their economic preponderance as well as their nationalistic unity. Thus the German Poles were almost completely mobilized for political independence by 1914

There was thus, when the War broke out, no common sentiment to hold the loyalty of all the Poles One group gravitated toward Russia in the hope that autonomy might be granted under the Russian crown, another, under M. Pilsudski, looked to Austro-German aid for the erection of a republican Poland that could serve as a buffer state against the Russian advance. A Polish legion was formed and it was offered to Austria But the Austrian suspicions of Pilsudski's republican-socialistic pretensions, together with the continual fighting in Galicia, forestalled a definite pronouncement of policy. However, in November, 1916, realizing that such a state would serve mightily their purposes on the Eastern front, the Central Powers combined to recognize the independence of Russian Poland. Galician Poland was merely given autonomy. Poland, in the ensuing years, was under German domination. The governor-general was German while the ruling council was selected by both governments. The council, for a time, in 1917, gave surprising manifestations of an independent spirit, but it was soon overawed by Germany. Under German occupation all opposition was crushed. The Austrian Poles, who demanded a real Polish state, were suppressed; Pilsudski, always a dissident force, was arrested and the Polish legion was used merely as an auxiliary of the German army. Now that Russia was no longer a menace, Polish hopes could be conveniently disregarded. The Poles were refused admittance to the discussions at Brest-Litovsk and were compelled to see the disputed district of Kholm turned over to the new Ukrainian Republic. Not until the close of the War did the hope of an independent Poland definitely materialize. In October, 1918, a National Polish Diet met, while at the same time the Austrian Poles quit the Reichsrat to assemble at Crakow. In November, Pilsudski was released by the German revolutionists and appeared in Poland to aid in the work of restoration. Meanwhile a Polish army, recruited in the United States and other countries, and recognized as a national unit by the Allies, had been fighting on the western front, while the Polish National Council, stationed at Paris, kept the Polish aspirations before the French, British and Italian leaders.

From Nov. 14, 1918 on, Pilsudski was invested with the full powers of a dictator. His known radical sentiments for a time threatened to disrupt Polish unity, and had it not been for his political astuteness the problem of creating a Polish state might have been well-nigh insuperable. But the conservatives were won over by the appointment to the premiership of M. Paderewski, the pianist, who stood high in the favor of the Allies as a result of his work with the Polish National Council. A Constituent

Assembly was next provided for and this body met at Warsaw on Feb. 9, 1919. Something of the divergent loyalties in the new nation may be gauged from the political grouping. There were, here, 91 National Democrats, 51 Polish Peasants, 19 Peasants' Union, 14 Socialists, 7 Workmen's Union, 8 Jewish party, 6 United Polish Peasants, 2 German Colonists. A Conservative bloc supported the Paderewski government. The problems before the administration were complex enough to try the strongest minds. The marking out of the frontiers in accordance with the Peace of Versailles and to the satisfaction of the Polish nationalistic aspirations led to a whole series of minor struggles in which, at one time or another, Poland saw herself engaged with almost all her neighbors; while the erection of a constitution, the economic rehabilitation of the country, the problem of racial minorities, in particular the Jewish question, all brought in their wake domestic difficulties of the most serious import. These matters must all be considered in some detail.

The peace treaties, as brought back to Poland in 1919 by M. Paderewski, made the following provisions: on the west and north the boundary followed fairly closely the ethnographic frontiers; the greater part of Posen and part of West Prussia were granted to Poland, while the disposition of Masuria and Upper Silesia was made to depend upon plebiscites. Danzig (q.v.) was made a Free City, though the "corridor" and the administration of the Vistula River were to be turned over to the Poles In the south, by a supplementary treaty signed on Aug. 10, 1920, Poland received West Galicia, with a slightly readjusted southern frontier. Eastern (Ruthenian) Galicia was to be provisionally assigned to Poland for a term of years. On the east no definite frontier was established by the treaties, owing to uncertainty regarding Russia's future status; but the Peace Conference merely recommended a tentative minimal eastern boundary, based largely on linguistic statistics, leaving details to be settled by Russia and Poland subsequently. Furthermore, the Peace Conference required Poland to sign a minority treaty, June 28, 1919, which provided for religious freedom; equal civil and political rights for all inhabitants regardless of race, language, or religion; and freedom of transit on Polish waterways and railways for Allied Powers. The number of hostilities in connection with the peace settlement was really astounding. With Czecho-Slovakia a dispute arose over the disposition of the border districts of Teschen (q.v), Zips, and Orava, and some fighting actually took place in January–February, 1919. The first, Teschen, occupied a peculiar importance, having rich coal and iron deposits as well as an important railway running through the heart of the district. In the west, the population was Czech, in the east, Polish The wrangling dragged on over a year until finally, by the intervention of the Council of Ambassadors in the middle of 1920, an agreement was reached whereby most of the coal mines and the railway were given to Czecho-Slovakia, while the city of Teschen was left in Polish territory. By the same decision the other two districts were similarly divided, the greater proportion of each going to Czecho-Slovakia With the Ruthenians in Galicia, war broke out, too, in 1919. The conflict was waged intermittently, attacks being sporadic and on defenseless populations as a rule. The Jews of Lemberg, in particular, suffered at the hands of the Poles. Not until April, 1920, did hostilities cease. By the agreement reached Poland gained de facto possession of East Galicia. It was the war with Russia, however, that occupied most of Polish attention and diverted consideration from the more pressing domestic problems. Egged on by the French, but as much motivated by her own nationalist ambitions, Poland, early in 1920, after some fighting in the previous year, launched a large-scale offensive against Russia. Her aim was to establish the frontier of 1772, and having gained the Ukraine as an ally, the moment was deemed propitious for the realization of the Polish hopes. Allied preoccupation elsewhere, and the desire on the part of the French to use Poland in a "sanitary cordon" against Bolshevism, gave spur to the adventure The Poles pressed forward for more than 300 miles, took Kiev in May, 1920, and threw their line south into the northwestern Ukraine. A Russian counteroffensive, however, soon swept the Poles back to Warsaw's gates (August, 1920). Only the severity of the terms proposed by the Russians prevented the closing of the war with a Russian victory. Confronted by a desperate situation, Poland turned at bay and, aided by French leadership and Allied munitions, once more resumed the attack. The Russians had pressed too far beyond the lines of their communications. By the end of August the Russians were in retreat and General Pilsudski had reached the line held by the Germans in 1918 on the eve of Brest-Litovsk. In the Peace of Riga, which followed on Oct. 12, 1920, the terms exacted by the Poles were surprisingly favorable. The eastern boundary was fixed far beyond the line recommended by the Peace Conference in 1919 and contained the cities of Pinsk, Kovel and Rovno; an indemnity was to be paid Poland; the Galician line was recognized; Lithuania was to be cut off from Russia, by a narrow arm of Polish territory extending north as far as Latvia. The treaty brought to a head another difficulty in which Poland was involved. During 1920 there had been some fighting between Poles and Lithuanians over the disposition of Vilna and the Suwalki region southwest of Vilna. The evacuation of Vilna by the Bolsheviks during the course of their retreat east in August, and the terms of the Riga treaty, intensified the struggle with the result that on October 9 General Zeligowski appeared in the city with an irregular military force, and, though unauthorized by the Polish government, drove out the Lithuanians and claimed the section for Poland Settlement by means of a plebiscite under League supervision was proposed, then abandoned, by the League; but, thanks in part to pressure from the League, Zeligowski withdrew from Vilna and elections for a local Diet were held in the disputed district in January, 1922. The Diet immediately voted for union with Poland, in February, whereupon the Polish parliament resolved (March 24) to annex Vilna, and the formal incorporation of the district into Poland occurred on April 18. Once more, as in so many other cases, the Allied Council of Ambassadors acquiesced in a fait accompli, and in March, 1923, fixed the northeastern frontiers of Poland in such a manner as to include Vilna, despite vehement Lithuanian protests. Thereafter, however, Poland

and Lithuania continued to quarrel over the division of a "neutral zone" which had been established between the two countries (See LITHUANIA.) Danzig, too, was the seat of trouble. Not content with the treaty provisions made for the Free City, Poland continued to agitate for a greater Polish control and in November, 1920, Paderewski, before the League Council, sought the right to police the city with Polish military. This demand was occasioned by the unfriendly attitude toward Poles in Danzig but more particularly by the fact that munitions for Poland, during the Russian war, had been held up by the port authorities Not until Oct. 25, 1921, did Poland consent to sign an agreement with Danzig and accept the Allied terms. (See DANZIG.) Much more serious was the conflict with Germany over the division of Upper Silesia (q.v.), described in another place.

It is thus evident how stormy was the early career of Poland. The consideration of the new constitution necessarily languished and it was not until Mar. 17, 1921, that the document was finally completed. It provided for a bicameral parliament (Seym), a responsible ministry, and a president elected for seven years by the parliament. Roman Catholicism was made the state religion though all other faiths were given freedom of worship Labor was officially recognized. State insurance against unemployment, illness and accidents was promised. A section modeled after the German constitution provided for the erection of local economic organizations, to centre eventually in the Supreme Economic Chamber of the republic The conduct of foreign affairs and the increasing economic instability were responsible for the frequent political crises. Paderewski fell from power Dec. 7, 1919, and 1920 saw two different cabinets. Radical disorders in Warsaw and Galicia and the continual turbulence of the Socialist and Workmen's members in the Assembly added to the general uneasiness. In 1921, the war ministry of MM Witos, Grabski, Skulski, and Daszynski resigned and was succeeded by a government headed by M. Ponikowski, which, in 1922, underwent a reconstruction. However, the new ministry lasted only four months, for in June, 1922, it was overthrown, and after considerable wrangling between the Diet and the President, a new ministry was headed by M. Nowak During this period there had been no legislation of any constructive character. It was not until November, 1922, that elections were held for members of the national diet. In the following month both houses assembled for the election. The domestic uncertainty was heightened by the complexion of the national diet. The National parties of the right and the left had, in the election, succeeded in gaining an equal number of seats, 177 each, so that the balance of power was thrown to the minority parties, e.g. the Jewish, Ukrainian, German, and Russian, who controlled, in all, some 90 votes. These parties united with the left and forced the election of M Gabryel Narutowicz as the first president of the republic to succeed the provisional president, General Pilsudski. M. Narutowicz, a brief 48 hours after he assumed office, was assassinated (December 16) by a demented painter Demonstrations against the racial minorities, and the Jews in particular, indicated the popular excitement in the week preceding the assassination. On Dec. 20, 1923, M. Wojciechowski was selected to become the new president.

The racial problem, that of the Jew above all, was a serious one. Though Poland, in common with other Succession States, had signed a minorities treaty with the Allies, and in particular had guaranteed the Jews educational and religious liberties, the inability or refusal of the government, especially during 1918–20, to defend the Jews from attack aroused much apprehension. Charged with being German sympathizers and fraternizing with the Bolsheviks, but above all, held in contempt because of their want of Polish patriotism and their adherence to trade, the Jews were singled out for a course of vilification whose fury was quite incomprehensible to western Europeans and Americans. By a vigorous social, economic, and educational boycott all things Jewish were declared taboo. Jewish officials were dismissed, shops blacklisted, and professional men, i e teachers, doctors, and lawyers, dropped from the universities, army and administrative posts The Poles charged that the Jews consistently refused to conform their customs and life to those of the Poles about them; that the Zionist movement fostered a growing separatism. The Jews contended that political representation in proportion to their numbers was denied them, for although they formed about one-seventh of the population they had only 11 members in a national assembly of 390. Again, the perpetual discriminations in education, politics, and the professions prevented the Jew from rising above the petty mercantile class and taking up those other pursuits where he might come in contact with the general cultural ideas of the west The unhealthy state of mind of the Pole toward the "alien"—though the Jew had lived in Poland for almost 1000 years—fostered by a war-weariness engendered by the conditions of the preceding five years, led to serious excesses during 1918–20, which did not cease completely even by 1924. Sir Stuart Samuel, on a mission to the country, ascertained that at least 348 Jews had lost their lives as the result of rioting and the depredations of the soldiery. Other outrages were innumerable. Mr. Morgenthau, heading an American mission, reported similarly.

Internal affairs in the midst of such a tumultuous political and economic scene could hardly be expected to unwind themselves in a purposeful or orderly fashion The country was four-fifths agrarian, settled by an uneducated and unskilled peasantry working on lands of which 40 per cent were owned by 18,000 proprietors. To create a class of small landowners (for which, already, there was an ambitious programme formulated in 1921), to teach them the modern technique, and then to provide them with opportunities for reaching their markets by the development of means of communication, were the insistent problems which a depleted treasury and a continually falling currency could do nothing to alleviate. The cost of living steadily mounted to the accompaniment of the inevitable strikes and lockouts. In July, 1923, about 70,000 textile workers were out in Lodz alone; 90 per cent of the men in the engineering trades of Warsaw were idle at the same time; there were building strikes in Posen and Lublin and labor disturbances in almost all the industrial centres. Cabinets continued to follow each other in rapid succession. During 1923, M. Witos, of the Peasant party, headed a

government for a time but before the end of the year he had suffered defeat and surrendered his place to M. Grabski. The drift was steadily toward the Right and the large landowners daily gained power, as it became evident in 1924 that the real problem before Poland was fiscal reform and a balanced budget rather than the more controversial and possibly more evanescent hope of an agrarian policy.

In the field of foreign relations, Poland indicated a desire to come to an amicable understanding with most of her neighbors. On Mar. 3, 1921, a treaty was signed at Bucharest providing for an offensive-defensive Polish-Rumanian alliance and conversations for the further strengthening of this union were carried on in June, 1923. As a result of the settlement of the Upper Silesia question (q.v.) measures were taken in 1921 for the restoration of friendly relations with Germany. On Nov. 7, 1921, a treaty with Czecho-Slovakia was signed at Prague by which each nation guaranteed the other a benevolent neutrality in the case of attack as well as the recognition of each other's rights in Slovakia and Galicia. For the development of trade and transport with Russia commissions were appointed, while the export of agricultural implements to Russia and the Ukraine was encouraged. In accordance with this spirit, on Sept. 2, 1923, a note was delivered at Moscow declaring Poland's readiness to recognize the Soviet Federation upon the acceptance, by all of its constituent parts, of the terms of the Riga treaty.

Improvement in the relations with Danzig were marked after the agreement of 1921. On Mar. 17, 1922, Poland signed with Finland, Esthonia, and Latvia an agreement for the establishment of an enduring peace, while later in the year representatives of the Baltic States met with Russian commissioners for the purpose of effecting a general disarmament in the region. By the end of October the boundary between Poland and the Ukraine was definitively fixed by a mixed commission. As far as general international affairs were concerned, however, Polish policy was in the interest of France. The French attitude toward Poland had been persistently friendly, so that by ties of gratitude Poland was united to her western ally. During 1916–19, the French had encouraged the organization of the Polish Legion and had championed Polish aspirations at the Peace Conference, going so far as to favor Polish claims to all Upper Silesia and both banks of the lower Vistula, and Danzig. In 1920, too, France had come to the aid of Poland in the Russian war and in the next year both had signed a defensive alliance. A general political alliance, pledging economic and diplomatic coöperation, and promising concerted action in case of unprovoked attack, was signed by France and Poland on Feb. 19, 1921. The alliance was supplemented by a commercial convention (Feb. 6, 1922) providing for reciprocal tariff concessions, by a loan agreement (1923) extending to Poland a French advance of 400,000,000 francs to be expended mainly for strategic railways and other military purposes, and by other commercial and military agreements. Under the friendly but not disinterested protection of France, and in close concert with the Little Entente to the south and the Baltic nations to the north, Poland had become the cornerstone of the barrier between Bolshevist Russia and vengeful Central Europe. It was a position of strategic importance and prestige, but likewise of potential peril. See DANZIG; LITHUANIA; SILESIA, UPPER; VILNA; GALICIA, EAST; UKRAINE; WAR IN EUROPE, *Eastern Front*.

POLAR RESEARCH. This field of exploration was less affected by the War than were other phases of similar activity. The Canadian Arctic expedition, Shackleton's voyage into Weddell Sea, the Greenland expeditions of Rasmussen and Koch, MacMillan's elimination of Crocker Land, the repeated efforts of a trans-Arctic voyage by Amundsen's *Maud*, Vilkitski's northeastern passage from east to west, and Cope's work in southwestern Graham Land were the most important in results.

Antarctic. Bold in plan and adventurous in execution was Shackleton's attempt to cross the continent of Antarctica, from the *Endurance* in Weddell Sea to the *Aurora* in Ross Sea. In the *Endurance* he penetrated Weddell Sea to 77° south latitude, 35° west longitude, and skirting the shores of the southern continent, added 200 miles of new (Caird) coast. No landing could be made, and the ship, beset in ice and drifting with the main pack, was eventually crushed. After the sea-floe drifting north melted, the crew reached Elephant Island by boat, from which isolated and ice-beset land they were finally rescued after four dangerous voyages by Shackleton. In 1917, this indomitable explorer rescued seven men of the *Aurora* marooned in Ross Sea, where three had died in the meantime. On a subsequent Antarctic voyage in the *Quest*, Shackleton died and was buried at South Georgia, 1922; the *Quest* reached, however, new positions in the Antarctic Ocean. Cope's expedition, 1920–23, wintered on the most southwesterly point reached on Graham Land, and there made extended physical observations. Its members failed, however, to cross Graham Land and explore the west shores of Weddell Sea.

Arctic. Most important was the Canadian Arctic Expedition, 1913–18, which was divided into two parties, the northern under Stefansson, and the southern under R. M. Anderson. Stefansson's plans were disarranged by the besetment and loss of his ship, the *Karluk*, under Bartlett. Continuing his exploration under many difficulties, Stefansson discovered several islands, and traced the continental shelf of the Arctic Ocean from Melville Island, northeast to 80° 7′, north latitude, 98° 54′ west longitude. He made extensive sledge journeys on the main ice north of Alaska, reaching 76° 36′ north latitude, 132° west longitude; later, his assistant Storkeson attained by sledge on the same ice approximately 74° north latitude, 150° west longitude. The southern division under Anderson did less spectacular work, but made most important scientific researches. Besides surveying Bathurst Inlet, it made a thorough biological and physical study of the adjacent regions. Aided by experts, Anderson was in 1924 editing the official reports, which were expected to fill two volumes of narrative and 16 of scientific memoirs. These volumes form a valuable contribution to American science, as they treat the fauna, flora, ethnology and other subjects of special interest, pertaining to Arctic Canada. Up to Mar. 1, 1924, 47 of the 76 memoirs had appeared, and the others were under preparation.

Next in value were the explorations of MacMillan. In his first voyage, 1913–17, he made an unprecedented northing into the unknown regions northwest of Grant Land, and by crossing by sledge the alleged site of Crocker Land, reported as a discovery by Peary, proved its nonexistence. MacMillan further explored the northern edge of Parry archipelago, discovering six islands and mapping Finlay Island, his farthest west. His second voyage, 1921–22, was to Baffin Land, where he added new coast line, explored the unknown interior and made collections of its fauna and flora; he also found new tribes of Eskimos His latest voyage, 1923–24, covered research on the glaciers of the Kane Sea regions. Incidentally he erected at Cape Sabine the tablet of the National Geographic Society marking the final work of the Greely expedition, which represented the United States in its first scientific coöperation with other nations—11 countries in all.

Rasmussen's fifth expedition from Thule, near Cape York, was engaged from 1920 in a biological survey of the Eskimo tribes living on the Arctic edge of North America, or on adjacent islands. His researches up to 1924 had progressed satisfactorily among the primitive polar people between Baffin Bay and Arctic Alaska.

Amundsen's Arctic expeditions, 1919–24, were marked by repeated disasters. Originally he planned to drift in the *Maud* across the Arctic Ocean, starting from Bering Strait. Forced to winter, owing to ice conditions, at Aion Island, Siberia, 1919–20, he discovered new islands, made collections of fauna and flora, and studied the Tchukchis Two despatch bearers perished en route to Norway Renewed efforts the next year damaged the ship so that she returned for repairs. Meanwhile Amundsen arranged to supplement the drift by an airplane flight from Alaska to Spitzbergen. The *Maud* was started again in 1922, and in 1924 was slowly and safely drifting west Failing on account of defects in his airplane in 1923, Amundsen arranged to fly from Spitzbergen to Alaska, having Lieutenant Davidson, United States Navy, as pilot.

Koch's explorations of extreme northern Greenland, in which he introduced the use of a motor tractor in field work, and reached 80° north latitude, are treated under GREENLAND.

Russia pursued explorations along the Siberian coasts, with reference to establishing regular summer sea traffic but the definite results were unknown. Vilkitski made, in 1915, the northeast passage from east to west. It was learned that the long missing Russian north polar expeditions of Russanoff and of Brusiloff perished east of Franz Josef Land.

POLASEK, ALBIN (1879–). An American sculptor and teacher, born at Frenstat, Moravia, who studied art at the Pennsylvania Academy of Fine Arts and the American Academy in Rome and in 1910 was awarded the Prix de Rome. From 1916 he was head of the department of sculpture at the Art Institute of Chicago. His sculptures have been exhibited at Rome, Paris, New York, Philadelphia, and Chicago and are on permanent exhibition at the Pennsylvania Academy of Fine Arts, the Metropolitan Museum of New York City, the Art Institute of Chicago, and the Detroit Museum. They include the bust of Pierpont Morgan at the Metropolitan Museum, a portrait of F. D. Millet at the Pennsylvania Academy of Fine Arts, "The Sower" at the Chicago Art Institute, "Aspiration" at the Detroit Institute of Art, and "Bubble" at the Milwaukee Art Institute.

POLICE POWER. See LAW, PROGRESS OF THE.

POLISH LITERATURE. See SLAVONIC LITERATURE.

POLISH NATIONAL COUNCIL. See POLAND.

POLITICAL AND SOCIAL SCIENCE, AMERICAN ACADEMY OF. A learned society founded in 1889 for the study of political and social science Its bimonthly official publication, *The Annals*, is devoted to the discussion of political and economic subjects. Among the subjects treated in 1915 were industrial opportunity, America's interests as affected by the War in Europe, and public budgets. In 1916 the subjects treated included national industries and the Federal government, preparedness and America's international programme, and new possibilities in education. During 1917 *The Annals* contained articles on the purposes and ideals of the Mexican revolution, modern insurance problems, and stabilizing industrial employment. A supplement issued in May of that year dealt with the Mexican constitution and with the relation of the United States to international affairs. The issues for 1918 were devoted to the discussion of the mobilization of American resources for war and relief work, rehabilitation, and labor *The Annals* discussed in 1919, with other subjects, a reconstruction labor policy, international economics, international reconstruction, and the railroad problem. During 1920 the following subjects were discussed, the new American thrift; bonds and the bond market; labor, management, and production, and social and industrial conditions in the Germany of to-day In 1920 the leading subjects were present-day immigration; the international trade situation; the revival of American business; and child welfare. In 1922 space was given to the Federal Reserve system; Russia to-day; the ethics of the professions and of business; America and the rehabilitation of Europe; and western Europe and the United States. During 1923 the following volumes were issued: *Public Welfare in the United States; The Direct Primary; Social and Economic Conditions in the Dominion of Canada; America's Relations to the European Situation*, and *Prohibition and Its Enforcement.* At meetings of the Academy held during the year, subjects of national and international interest are discussed. At the meeting of 1923 the Academy was addressed by Sir Auckland Geddes. Two conferences were held in November and December, on the coal industries and the Monroe Doctrine, respectively. The president in 1923 was L. S. Rowe.

POLITICAL SCIENCE, ACADEMY OF. An organization founded in 1880, composed of men and women interested in political, economic, and social questions. It works in coöperation with Columbia University and publishes *The Political Science Quarterly*, with a Supplement twice a year. This Supplement contains a record of political events of the world in general and of the United States in particular. Semi-annual meetings are held, and many subjects of importance were discussed in the decade 1914–24. One of the most interesting and important, in 1919, considered the League of Nations Covenant. An

extensive volume on the Covenant was published, including addresses by many statesmen. Of these, about 5000 copies were distributed. The thirty-fifth annual convention of the Academy was held in New York City in 1919. At the annual meeting in 1920, the subject under discussion was American and foreign trade relations; about 1200 persons attended. The annual meeting of 1921 had for its subject construction experiments in industrial coöperation between employers and employees; a session was held jointly with the Industrial Relations Association of America. At the annual meeting in 1922 addresses were delivered on the money problem; these included "The Outlook for the Gold Standard," "The Agricultural Credit Problem," and "The Outlook for a Stable Monetary Problem Abroad." The annual and semi-annual meetings held in New York City in 1923 were of unusual importance. At the semi-annual meeting law and justice were discussed, and at the annual meeting the chief subject was American economic policies since the Armistice. Both meetings brought together a distinguished group of persons competent to present the different points of view of these subjects. Detailed reports of the meetings are published in the *Proceedings* of the Academy, and *The Political Science Quarterly* had many notable contributions in 1923.

The educational work of the Academy is carried on by meetings and publications. The publications comprise, besides *The Political Science Quarterly*, *The Annual Record of Political Events* and *The Proceedings* (semi-annual). Semi-annual meetings are held, and many subjects of importance have been discussed in the decade 1914–24; these have included: American mercantile marine, national conference on war economy, inflation and high prices, national expenditures and public economy, railroads and business prosperity, and wealth and taxation. The membership of the society is 5600. The officers are: president, Samuel McCune Lindsay; vice presidents, Albert Shaw and Paul M. Warburg; secretary, Parker T. Moon; Treasurer, George A. Plimpton; assistant treasurer and executive secretary, Ethel Warner.

POLITICS, INSTITUTE OF. A conference founded at Williams College through the generosity of Bernard M. Baruch, and continued with the financial coöperation of the General Education Board, for the purpose of advancing the study of politics and promoting a better understanding of international problems and relations. Although the Institute was proposed in 1913, the first session, as a result of various conditions, was postponed until the summer of 1921. Membership is limited to members of the faculties of colleges and universities and those to whom, by reason of special training and experience in the field of politics, invitations are extended. The sessions have been notable for their interest and importance. The first, held in July and August, 1921, was devoted to the study of international relations. Among those present and participating were Viscount James Bryce of England, Count Paul Teleki of Hungary, Tommaso Tittoni of Italy, and Prof. A. Viallate of France. In the second session, held in 1922, the subject was again international relations in their historical, political, legal, and economic phases. Special emphasis was placed on the problems of Central and Eastern Europe, the Far East, and Latin America. Among the eminent scholars and statesmen present were Lionel Curtis and Philip Henry Kerr of England, Manoel de Oliveira Lima of Peru, Raymond Recouly of France, and Dr. Joseph Redlich of Austria. At this session nearly 200 members were present. The third session was held from July 26 to Aug. 25, 1923. The question of international relations was again treated from many angles and by eminent representatives of the greater and lesser Powers. Addresses were delivered by Gen. Tasker H. Bliss, Sir Edward Grigg of London, Count Harry Kessler of Berlin, and others. Of special interest was the discussion of the international aspects of the Russian question. The session of 1924, beginning August 1, continued the discussion of economic, financial, political, and social conditions throughout the world. Among those who participated were Sir Valentine Chirol; Louis Aubert of Paris; Sir James Arthur Salter, finance chief of the League of Nations; R. H. Tawney, economic adviser of the British Labor party; Prof. Moritz J. Bonn of Berlin; Sir Paul Vinogradoff of Oxford; Yusuki Tsurumi of Tokyo; Rear-admiral Joseph Strauss, and John Spargo. The administrative officers of the Institute number Harry Augustus Garfield, chairman; Walter Wallace McLaren, executive secretary; and Willard Evans Hoyt, treasurer. The board of advisors includes distinguished representatives of many large universities.

POLK, FRANK LYON (1871–). An American public official (see VOL. XIX). He was appointed in the latter year councilor of the Department of State, where he served until 1919, when he became Under-Secretary of State In the absence of Secretary Lansing in 1918–19, he was Acting Secretary of State. He was appointed Commissioner of the United States to negotiate peace in 1919 and was head of the American delegation to the Peace Conference in Paris from July to December of that year.

POLLOCK, CHANNING (1880–) An American author and dramatist, born in Washington, D. C. He studied at Bethel Military Academy at Warrenton, Virginia, and at the Polytechnique in Prague. He had a varied newspaper career before devoting his attention to dramatic writing His later plays include: *A Perfect Lady* with Rennold Wolf, produced by Rose Stahl (1914); *Ziegfeld Follies of 1915*, with Rennold Wolf (1915); *The Grass Widow*, with Rennold Wolf (1917); *Roads of Destiny*, produced by A. H. Woods (1918); *The Crowded Hour*, with Edgar Selwyn, produced by Selwyn and Company (1918); *The Sign on the Door*, produced by A. H. Woods (1919), by Gladys Cooper at the Playhouse in London (1921), and at the Théâtre Renaissance in Paris, as well as in Vienna, Madrid, Amsterdam, etc.; *Ziegfeld Follies of 1921;* and *The Fool*, produced by Selwyn and Company (1922). During 1923 he lectured under the direction of the Pond Bureau. Besides his plays he wrote many stories and made dramatizations of numerous books.

POLLUTION OF STREAMS. See SEWERAGE AND SEWAGE TREATMENT.

POLO. The United States regained possession of the International Polo Cup, lost in 1914, by defeating Great Britain in two straight matches at Hurlingham, England, in 1921. The scores were 11 to 4 and 10 to 6. The victorious team comprised Louis E. Stoddard, Thomas Hitchcock, Jr., J. Watson Webb, and Devereux Milburn, while the losing four were Colonel

H. A. Tomkinson, Major F. W. Barrett, Major Lockett and Lord Wodehouse. In 1923, the United States was the scene of several international competitions, the most important being the matches between the army fours of the United States and Great Britain, in which the Americans were successful. The Meadow Brook Club of Long Island also defeated the British army team in the final match for the United States national open championship. Several American colleges took up polo after the War, Yale, Princeton and Harvard in particular developing creditable teams. In 1923, a Yale four captured the intercollegiate championship, both in indoor and outdoor play. In 1924, the national intercollegiate title was won by Princeton, in competition with the University of Arizona.

POLYTONALISM. See MUSIC.

POMERANIA. See POLAND.

POMERENE, ATLEE (1863–). An American legislator (see VOL. XIX). He was United States Senator for the term 1911 to 1917 and was reëlected in 1917 but defeated by Simeon D. Fess in 1922. In March, 1924, he was appointed by President Coolidge one of the two counsel to investigate the question of oil leases and the criminal responsibility of persons whose connections with it had been revealed by the proceedings of the Senate Committee investigating oil leases. See PETROLEUM.

POMONA COLLEGE. A coeducational institution at Claremont, Cal., founded in 1887 under Congregational auspices but free from ecclesiastical control. In the 10 years between 1914 and 1924, the physical equipment and material resources of the college were largely increased. About 50 acres were added to the campus; the spacious central quadrangle was opened and parked. Five large reinforced-concrete buildings were erected and two others reconstructed in such a way as to be practically new. The library grew from 22,000 to 41,000 volumes, and the teaching staff from 45 to 70. The student body was limited to 750 undergraduate members. In 1924, the endowment funds of the college amounted to about $1,500,000, and the total assets to about $3,700,000. President, James Arnold Blaisdell, D.D., LL.D.

PONSONBY, ARTHUR (1871–). A British public official, educated at Oxford. He was page to Queen Victoria from 1882 to 1887 and was connected with the diplomatic service at Constantinople and Copenhagen from 1894 to 1899. From 1906 to 1908 he was private secretary to Sir Henry Campbell-Bannerman. He was a member of Parliament from 1908 to 1918, and in 1924 he was appointed Under-Secretary of State for Foreign Affairs in the Labor cabinet of Ramsay Macdonald. He published *The Camel and the Needle's Eye* (1909); *The Decline of Aristocracy* (1912); *Democracy and Diplomacy* (1915); *Wars and Treaties, 1815–1914,* (1917); *Rebels and Reformers,* with Dorothea Ponsonby (1917); *Religion in Politics* (1921); and *English Diaries* (1923).

PONTOPPIDAN, HENRIK (1857–). An popular Danish novelist (see VOL. XIX). In 1917 the Nobel Prize for literature was divided between him and Karl Gjellerup. His recent publications include *Enslevs Dod* (1915); *Favsingholm* (1916); *Sandinghe Menighed* (1916); *Torben og Jytte* (1916); *Et Kaerlighedseventyr* (1918); *En Vinterrejse* (1920); and *Hojsang* (1921).

POOLE, ERNEST (1880–). An American author, born in Chicago. He graduated from Princeton in 1902 and for several years lived in the University Settlement in New York City. Here he accumulated material for articles and stories. His first published work was a play, *None So Blind.* This was followed by *The Man's Friends; The Harbor* (1915); *His Family* (1917); *His Second Wife* (1918); *Blind* (1920); *Beggar's Gold* (1921); and *Danger* (1924).

PORK. See LIVE STOCK.

PORTER, ARTHUR KINGSLEY (1883–). An American art historian. He graduated from Yale in 1904, and studied architecture at Columbia University. After several years of travel and study he became lecturer and then assistant professor at Yale University. In 1920 he was appointed professor in the history of art at Harvard University. Among his best-known books are *Mediæval Architecture* (1908); *The Construction of Gothic and Lombard Vaults* (1912); *Lombard Architecture* (1915–17) and *Romanesque Sculpture of the Pilgrimage Roads* (10 vols., 1923).

PORTER, HAROLD EVERETT ("HOLWORTHY HALL") (1887–). An American writer, born in Hyde Park, Mass. He graduated from Harvard in 1909 and for several years was engaged in the publishing business in Boston and New York. He served as captain of the Air Service in the United States Army in 1918 and later in the same year was detailed to the office of the Secretary of War. In collaboration, he wrote an official history of all types of aeroplanes and engines made in the United States. He was a member of many patriotic and other societies. His books include *Pepper* (1915); *Help Wanted* (1916); *The Six Best Cellars,* with H. M. Kahler (1919); *Egan* (1920). He also wrote several books on aviation and was a frequent contributor of short stories to leading magazines.

PORTLAND. A city and port of entry of Oregon. The population increased from 213,251 in 1910 to 258,288 in 1920 and to 273,621 by estimate of the Bureau of the Census for 1923. A major street plan and port development scheme were partly carried out by the city between 1914 and 1924. In the new and developing portions of the city, eight principal streets were planned 100 feet wide, and water-front hauling streets 120 feet wide. A system of boulevards and parkways was laid out and the minor residence streets limited to narrow pavements. Nine grade crossings were eliminated by depressing the railroad tracks over the entire distance between the crossings, and building viaducts to carry the streets over. The cost of this, $1,055,000, was met by the railroad and the city together. A bond issue was authorized in 1922 for two concrete bridges over the Willamette River, allotting $3,000,000 to a new bridge on the site of the old Burnside bridge and $1,600,000 for another bridge about 1½ miles further upstream at Ross Island. The first was about 3000 feet long with a bascule centre span; Ross bridge, which had no draw, but cleared low water by 132 feet, was to be 4000 feet long and 54 feet wide. A memorial civic centre was planned by the city. In 1917, $3,000,000 in bonds were issued by popular vote for improving the port facilities, constructing a grain elevator of 1,000,000 bushels capacity, and a dock and warehouse 1000 feet long by 175

feet wide. Further plans for port improvement, adopted in 1923, included the purchase by the city of about a mile of water-front property between four downtown bridges, building a sea wall and filling the land behind it, moving the interurban railroad tracks from streets in the city to the filled land and elevating the approaches to the bridges so they would span the tracks, and the building of interurban terminals, public markets, and an interceptive sewer. A 35 foot channel was dredged from Portland to the sea. A new post office building was completed at a cost of $1,000,000 by the Federal government; a new sewer in the Lents district was completed by the city in 1924 at a cost of $780,000, and a water conduit which was to have a capacity of 65,000,000 gallons was under construction. Building permits rose from 5959 valued at $8,334,075 in 1914 to 14,518 valued at $25,247,135 in 1923, bank clearings increased during the same period from $578,884,000 to $1,871,946,000, exports from $13,806,500 to $44,012,560, and imports from $3,890,222 to $9,503,863.

PORTLAND CEMENT. See CEMENT.

PORTO RICO. An island possession of the United States in the West Indies. The population of Porto Rico increased from 1,118,012 in 1910 to 1,299,809 in 1920. The distribution in 1920, according to color, was as follows: white, 948,709; black, 49,246; mulatto, 301,816; all others, 38. The chief cities, with their population in 1920, are San Juan, 71,443; Ponce, 41,912, and Mayaguez, 19,124.

Government. The act of 1917 separated the legislative and executive functions and created an appointive judiciary system and an elective Senate. The chief executive is a governor, appointed by the President. The Legislature consists of two Houses, the Senate composed of 19 members and the House of Representatives composed of 39 members. A resident commissioner represents Porto Rico in Congress. Six heads of departments form a council to the governor.

The Judiciary includes the supreme court, eight district courts appointed by the governor, and minor courts also appointed by the governor.

Agriculture. The number of farms in Porto Rico decreased from 58,371 in 1910 to 41,078 in 1920; the improved land in farms decreased from 1,570,304 acres to 1,303,547. The value of farm property, however, increased from $102,378,874 in 1910 to $179,392,511 in 1920, and the average value per farm increased from $1754 to $4367. The production of sugar cane increased from 3,180,750 tons in 1909 to 3,961,984 in 1919; the value of sugar exports increased from $23,545,922 in 1910 to $46,207,000 in 1923. The production of tropical fruits became an important industry in the island; the total value of shipments of fruit and fruit products in 1923 amounted to $5,154,290. The acreage in coffee decreased from 186,875 in 1909 to 193,561 in 1919, and the value of the production increased from $5,292,179 to $11,707,391. In 1923, 16,000,000 pounds were exported, valued at $3,000,000 The owners of farms decreased from 46,779 in 1912 to 36,407 in 1920; the number of farm managers increased from 1170 in 1912 to 1213; the tenant farmers decreased from 10,422 in 1910 to 3458 in 1920. The white farmers in 1910 numbered 44,251, compared with 35,194 in 1920; the colored farmers decreased from 13,850 to 5884. The extension work in the island is carried on by the Department of Agriculture and Labor. Seed selection received special attention throughout the decade, and experiments resulted in a considerable development of cotton-growing. A vigorous campaign was carried on for the elimination of insect pests. The extension of the Federal Loan Act in 1922 was of great value to farmers in Porto Rico. Agricultural conditions after 1919 were generally favorable, although there were decreases in certain of the crops. The production of sugar in 1923 was 379,000 tons and the value of the sugar export was $46,207,000. The production of coffee declined from 1914, when 50,000,000 pounds were exported; in 1923, only 16,000,000 pounds valued at $3,000,000 were exported. The tobacco industry had a remarkable increase. In 1913, only 473 persons were employed in its production; in 1919, there were 7272, and in 1922, 11,962. In 1923, 14,904,723 pounds of leaf tobacco and 4,668,812 pounds of scrap tobacco were sold from Porto Rico. The total value was approximately $10,000,000.

Manufactures. The chief industry of Porto Rico being agriculture, its manufacturing is, to a large extent, undeveloped. The number of establishments decreased from 939 in 1909 to 619 in 1919. The persons engaged in manufacture remained practically stationary, numbering 18,122 in 1909 and 18,454 in 1919. The chief industries are the manufacture of sugar and molasses, tobacco manufacturers and the cleaning and polishing of coffee. In 1919, there were manufactured 686,037,703 pounds of raw sugar; 122,668,473 pounds of clarified sugar; 10,342,600 pounds of brown sugar; 18,783,172 gallons of molasses, as compared with 566 445,203 pounds of raw sugar and 17,374,097 gallons of molasses in 1909. The total value of all kinds of sugar in 1919 was $55,607,202; of molasses, $637,799; and of all other products, $166,931, or an aggregate value of $66,411,932. In 1909, the raw sugar manufactured was valued at $20,164,887 and molasses at $397,008. In 1919, a total of 171,184,749 cigars were manufactured, compared with 217,792,000 in 1909. The total value of tobacco products in 1919 was $8,134,534 compared with $6,060,393 in 1909. The total quantity of cleaned and polished coffee in 1919 was 50,252 820 pounds, as compared with 44,350,435 pounds in 1909. The total value of products increased from $36,749,742 in 1909 to $85,506,834 in 1919. The capital invested increased from $25,554,385 in 1909 to $83,151,310 in 1919. The value added by manufacture increased from $15,270,450 in 1909 to $25,679,560 in 1919. The manufacture of breads and bakery products, men's clothing, food preparations, and printing and publishing also are of considerable importance. The manufactures are limited almost entirely to the larger towns, San Juan, Ponce, Mayaguez, Caguas, Bayamon and Arecibo.

Mineral Production. Stone forms practically the only mineral production of Porto Rico. The total value of the product of all the quarries in 1919 was $158,157, compared with $5459 in 1909, or an increase of nearly 3000 per cent. There were 14 quarries under operation in 1909, and 13 quarries in 1919, employing about 200 wage earners.

Education. Since the island became a territory of the United States, the government of Porto Rico has used the utmost efforts toward the education of the people, especially the children. These efforts have been well received by the people and the results have been

extremely favorable. There is an unusually large school population. Out of a total of 1,297,772 in 1920, 452,446 were between the ages of 5 and 18. The percentage of school population, therefore, is 35, which is probably the largest percentage found anywhere in the United States, or perhaps in the world. The average daily attendance in all the public schools increased from 155,830 in 1914 to 184,991 in 1920, and to 225,600 in 1923. In the latter year 134,405 pupils were enrolled in rural schools and 91,195 in urban schools. In addition there were 5632 pupils in private schools. The total number in public and private schools was 231,232. At the time of the American occupation, 80 per cent of the population were found to be illiterate. This proportion was reduced in 1910 to 66 per cent and in 1920 to 55 per cent. In 1899, only 8 per cent of the persons 5 to 17 years of age were attending school; in 1920, over 45 per cent were reported in school. Special attention was given during the decade 1913–23 to practical instruction in agriculture. During the first decade of American occupancy, 950 rural schools were established; there were 1700 in 1920 and 2000 at the close of 1923. Industrial education also received adequate attention. In 1914, manual training for boys and household economics for girls were made obligatory for students in grades 6 to 10 in the public schools, in towns where the attendance warranted the installation of the necessary apparatus. The importance of placing education within the reach of a large number of illiterate adults was early recognized and for their benefit night schools were established. In 1914, an average of 825 such schools were maintained, and this number had greatly increased in 1923. During the decade, instruction in hygiene and health preservation was established and strengthened. Dental clinics were established in many schools and general health clinics were started and medical inspection in rural schools was begun.

Facilities for higher education were provided by the University of Porto Rico and by the College of Agriculture and Mechanic Arts at Mayaguez. The university consists of a College of Liberal Arts, College of Law, College of Pharmacy, Normal School, and High School division The number of students enrolled in 1922-23 was 1477; the number of professors and teachers was 77.

Trade and Commerce. The remarkable commercial expansion of Porto Rico in the decade 1913–23 is shown by a comparison of trade figures. In 1913–14, the combined value of imports and exports was $79,509,549; in 1923, it was $154,237,655. The merchandise shipped from Porto Rico to the United States in 1914 was valued at $34,423,180; in 1923, it was $77,007,257. The imports from the United States in 1914 were valued at $32,568,368, and in 1923, $64,743,462. The chief exports are sugar, cigars and cigarettes, tobacco leaf and coffee. The exports of sugar increased from 320,633 tons valued at $20,240,335 in 1914 to 355,423 tons valued at $46,207,276 in 1923. There were exported, in 1914, 150,363,991 cigars and 184,625,596 in 1923. The tobacco leaf and scrap exported in 1914 was valued at $3,206,610, and in 1923 at $9,647,063. The coffee exports in 1914 were valued at $8,193,544 and in 1923 at $3,188,002, a considerable decrease. The exports of fruit, including oranges, pineapples, coconuts, grapefruit, were valued, in 1914, at $3,400,903, and in 1923 at $5,154,290. During the American occupation there was a rapid growth of trade with the United States. During the 23 years covered by this occupation, the value of imports from all foreign countries increased only from 3 to 7 million dollars, while the value of purchases from the United States increased from 6 to 64 million dollars The value of exports from Porto Rico to all foreign countries increased from 3 to 5 million dollars, while the value of Porto Rican shipments to the United States increased from 3 to 77 million dollars. More than 90 per cent of all the external commerce of the island is with the United States.

Finance. The beginning of the decade 1913–23 was marked by a severe financial crisis caused by the fact that laws passed by the Legislature to provide sums for public improvements failed to attain the results expected. The result was a large deficit. Prompt measures were taken to avert disaster and the legislative assembly in 1914 promptly passed laws to meet the situation. All forms of expenditure upon public improvements were suspended, and provision was made for an issue of $1,000,000 worth of bonds to reimburse the treasury for money already expended, and to provide for further work. An Economy Commission was also appointed to readjust the finances. The total receipts of the treasury for the year 1913–14 was $10,108,708 and the expenditures amounted to $7,278,328. The receipts for the fiscal year 1922–23 were $10,118,891 and the expenditures $10,801,640. The bonded indebtedness in 1913–14 was $5,925,000. This had increased, in 1920, to $10,264,000, and in 1923 to $12,694,000.

Transportation. An elaborate system of excellent roads has been perfected and as a result of the work during the decade 1913–23, there were over 1000 miles of improved highways at the end of that period. A large part of the transportation of commodities is done by motor trucks over these highways. There were, in the island, 339 miles of railroad. Important improvements were made during the decade in San Juan harbor where a reinforced concrete bulkhead was built along the entire waterfront. Streets leading to the harbor were paved and made suitable for the heavy transportation. The new pier at Ponce was completed and placed in commission in 1914. In 1920, provision was made for the construction of a large new pier in San Juan harbor and the expansion of the bulkhead. The harbor was also dredged, in order to provide navigation by the largest vessels.

Health and Sanitation. The sanitation service in the island was organized in 1913 under a law passed in 1912, and during the decade 1913–23 vigorous and successful work was carried on by this service. Successful efforts were also made during the decade for the building, in various cities, and towns, of modern aqueducts for the supply of pure water, for sewer systems, for sanitary slaughterhouses and meat markets, and for clean dairies. Great improvement was made also in the proper construction and plumbing of dwelling-houses. The work of eradicating the hookworm, which was so prevalent in the island that over 90 per cent of the laboring-people were infected, was undertaken. The Insular Health Service and the Rockefeller Foundation coöperated for the eradication of

the disease, with remarkable success. By 1923, approximately one-sixth of the rural population of the island had received treatment. Tuberculosis is the chief menace to the health of the people. The percentage in proportion to general mortality increased from 7.28 in 1914 to 9.45 in 1923. Every effort was being made to eliminate conditions favorable to this disease. Malaria ranks third in mortality records. In 1923, arrangements were made by which the Rockefeller Foundation united with the insular authorities in an intensive campaign for mosquito and malaria control. The death rate increased from 18.6 per thousand in 1913 to 21.11 per thousand in 1923. It may be pointed out, however, that the rate for 1923 was the lowest ever recorded on the island. For 1912, it was 24.02. A leper colony was maintained on the Island of Cabras at the entrance of San Juan harbor. Arrangements were made to remove this colony to the mainland and work was begun in 1923 for the improvement of the new location. In 1910, a service was instituted in the island for the study and prevention of tropical and transmissible diseases, and in 1920 the Legislature created an institute of tropical medicine and hygiene. This institution performed services of great value in investigation and research and hundreds of patients were treated annually for various diseases.

History. The most important event in the political history of Porto Rico in the decade 1914–24 was the passage by Congress, in 1917, of a new Organic Act, providing for the government of the Islands. The beginning of the decade was one of financial difficulty and economic readjustment. Business conditions in Porto Rico were greatly affected by the tariff law passed in 1913. More important than this, however, was the serious decline in the sugar industry in 1914, owing to local and general conditions. In 1915, because of a lack of cooperation between the two houses of the Legislature, comparatively little important legislation was enacted. The Legislature of 1916 passed several important measures relating to revenue and taxation. On Mar. 2, 1917, President Wilson approved the new Organic Act for Porto Rico. This was received everywhere with great satisfaction The people were especially pleased with the granting of American citizenship. By terms of this measure the legislative power is vested in a Legislature consisting of two houses. The Senate consists of 19 members elected for four years and the House of Representatives consists of 39 members elected for four years. Sessions are held biennially. The designation of the qualifications for suffrage is left to the Legislature. Both branches of this body are elected by the voters but its action must be approved by Congress and by the Governor, who is appointed by the President. A "Resident commissioner" to represent the islands in Congress is elected by the people. With the entrance of the United States into the War, many new problems arose in Porto Rico. Among these was the peril of interrupted communication with the continents and the laws of ships engaged in trade. This tended to increase the price of foodstuffs, which were already abnormally high. A Food Commission with wide powers was appointed. After the passage of the compulsory military service law, the people of Porto Rico showed a strong feeling of patriotism and loyalty, and readily joined in all the activities, including subscription to the Liberty Loan issues. The Legislature in 1917 passed a joint resolution providing for the holding of general elections and providing for nomination of candidates. After Mar. 2, 1918, the prohibition of all alcoholic beverages went into effect. A destructive earthquake occurred in October, 1918. The heaviest losses were at Mayaguez and Aguidilla. About 150 lives were lost and the damage to government works and public buildings was over $1,000,000. A great sea wave followed the earthquake and increased the loss, especially at Aguidilla. The Legislature in 1918–19 passed a new election law changing the methods and machinery of election, a new municipal law, providing for a larger degree of self-government, a grand jury law, several labor laws, and a measure establishing a minimum wage. The year 1920 was one of unusual prosperity and progress, although there were several strikes during the year in the sugar cane fields and among the dock workers. In spite of these disturbances the general prosperity of the island increased greatly. A special session of the Legislature, an Apr. 26, 1920, passed an important amendment to the tax laws. It also amended the excise laws, the election law, the municipal law, and the workmen's compensation law. An act was passed authorizing coöperative societies of production and consumption. E. Mont Reily was appointed governor by President Harding in July, 1921, succeeding A. M. Yager, who had occupied that post since 1913. Following the inauguration of Governor Reily, the aggressive attitude adopted by him toward the political leaders of the island at once created a situation of great difficulty. The Unionist party was accused by supporters of Governor Reily of aiming at secession from the United States. This party was the most powerful of the political bodies of the island and was headed by Antonio R. Barcelo, president of the Senate. The leaders of this party were charged by Governor Reily with sedition and he administered a severe rebuke to Señor Barcelo, who resigned from the leadership but was obliged to resume it on account of the insistence of his supporters. The Governor dismissed several high officials and replaced them with Republican successors. In this he was severely criticized By the end of the year a majority of both the Lower and Upper Houses petitioned President Harding for the removal of Governor Reily. The President took no action, but Governor Reily resigned on Apr. 1, 1923 He was succeeded by Horace M. Towner, under whose administration political difficulties subsided. The Legislature of 1923 amended the excise tax law, amended a banking law, created a tax and revenue commission, created a coal commission, and created also a rural improvements commission.

PORTUGAL. A republic of western Europe with an area, including the Azores and Madeira islands, of 35,490 square miles, and a population in 1920 of 6,041,000. The 1911 population had been 5,957,985. The chief towns, with their populations in 1920, are: Lisbon, the capital, 489,667; Oporto, 203,199; Setubal, 37,074; Braga, 21,970. Emigration continued to keep the population almost stationary; 31,138 natives left the country in 1919 for Brazil and the United States, largely. Between 1912 and 1922 the total emigration was estimated at 700,000. In spite of frequent governmental decrees, education made no perceptible advances. The number of primary

and secondary schools in 1920 showed little increase over those recorded in 1911. Seventy-five per cent of the population was believed to be illiterate.

Industry and Trade. After 1902, when the last census of agriculture was reported, the state of agriculture declined, being handicapped by lack of transport facilities and of efficient use of fertilizers. In the earlier year, 34.9 per cent of the total area was devoted to tillage; of late (1921) this had dropped to 33.6 per cent. Waste land increased from 43.1 per cent to 49.1 per cent of the total. The yield of wine, one of the most important activities, dropped from 6,869,400 hectoliters in 1908 to 4,392,780 hectoliters in 1919. The cereal crops cultivated, i.e. rye, wheat, corn, were for home consumption and the fattening of stock. Articles that entered into the trade of the country, indicating a certain amount of application, were cork, olive oil, raw wool, hides, sardines, and wine. The trade fell off during the War, as may be seen from the following: exports and imports for 1913 (escudo at par or 53¼ pence per escudo), £17,986,222 and £8,152,222; exports and imports for 1918 (escudo at 30½ pence) £11,561,990 and £9,774,720. The continued decline of the escudo brought the trade record still lower in the years succeeding. Thus, while exports to the United Kingdom were £9,747,000 in 1918, they fell to £4,589,000 in 1922. Tonnage figures reveal the same state of affairs In 1913, 10,638 vessels of 24,368,120 tons entered Portuguese ports; in 1917, 5860 vessels of 4,906,599 tons entered; in 1920 (the best post-armistice year), 9909 vessels of 16,101,695 tons entered. During and after the War the general economic conditions reflected the prevailing social and political unrest. Raw materials could be obtained only with difficulty—the shortage of cotton, gasoline, tin plate, and coal being particularly severe—and factories and mines had to suspend operations. From 1914 to 1918, the average price increase of foodstuffs was 263 per cent. The failure of wages to rise accordingly (increases were only for 50 to 100 per cent) resulted in severe strikes in the railroads, telephone companies, shipping, metallurgical industries, etc. However, the strikes were successful in raising wages 20 to 30 times the pre-war rates, while the cost of living advanced 20 times. Attempts in 1918 and in 1920 to check the depreciating exchange by government enactment were unavailing. In 1918, a law was passed requiring half the payments of import duties in gold; in 1920, certain imports were banned altogether because of the rapid flow of gold out of the country. Yet so rapid was the disappearance of the gold reserve that in 1922 the National Bank of Portugal had only 8,577,180 escudos in gold, to 734,388,164 escudo paper notes in circulation. By December, 1923, paper in circulation totaled 1,395,700,000. Therefore, whereas the escudo had been worth 53½ pence before the War ($1.08), by 1921 it had declined to 7 pence ($0.10) and by the end of 1923 to about 3½ cents. Only the activities of the colonies succeeded in keeping the home industries active, for the raw materials imported made up in part for the decline of the foreign trade.

Communications. In 1913, there were 1854 miles of railway in operation; in 1923, 2046 miles. The steady depreciation of equipment and the falling off of traffic piled up the obligations of the systems. In 1923, 12,000,000 gold escudos were needed for repairs and replacements. Action was taken in 1921 toward the better upkeep of the highways.

Finance. The budget for 1914–15 called for revenues of 79,649,140 escudos and expenditures (ordinary and extraordinary) of 83,390,965 escudos. The 1922-23 budget included revenue estimates of 276,137,853 escudos and expenditures of 561,326,152. (It should be borne in mind that the escudo had by that time declined to one-twenty-fifth of its nominal value.) All attempts to check the mounting deficits failed. From 1914 to 1924, the average annual deficit was 197,000,000 escudos. For 1921-22, the deficit was 370,820,000, and for 1922-23, an estimated deficit of 295,190,000. The decision to resort to loans for the meeting of war expenditures increased the national debt enormously. In 1913, the external debt amounted to 175,396,150 escudos; on Dec. 31, 1923, the external floating debt amounted to 2,686,403,269 paper escudos (at current exchange rates); on July 31, consolidated external debt was 1,764,000,000 paper escudos. By 1923 the internal debt had mounted to 2,049,000,000 escudos (as compared with 713,689,000 in 1913). (In connection with financial figures, it should be noted that Portuguese official data were conflicting: making it impossible to render consistent statements on the subject.) In 1923, to check the speculation and stabilize the currency, the government offered a loan of £4,000,000 gold bonds to be paid for in escudos at the rate of 5 pence to the pound In February, 1924, in spite of all promises to the contrary, the government coolly repudiated the interest payment in gold on this loan.

Administrative Affairs. During the period, decrees affecting working conditions, accidents, women and child labor (1914–15) and the eight-hour day for government employees (1919), were promulgated. In 1918, a ministry of agriculture was set up with extensive powers for the encouragement of production by the renting of cattle and machinery; and the extension of credits. By enactment in 1914 and later in 1919, extensive autonomy was granted to the colonies. State aid was guaranteed settlers; the status of native laborers was advanced; expert agricultural and geological investigations were promised. These measures were occasioned by the fact that the Union of South Africa sought to acquire Portuguese East Africa, and Belgium, northern Angola. The home government realized that only the colonies might hasten the resurrection of Portugal; the loss of them would mean the definite submergence, economically, of the country.

History. Portugal's recent history was a continuous change of administrations accompanied by crises of smaller or greater importance. The great gulf existing between political leaders and the people at large was perceptible as ministries rose or fell amid a general indifference. The increasing illiteracy, the steady emigration of the peasantry to the New World, and the lack of capital for new enterprises, all accounted for the general stagnation. The violent break between church and state, which had been one of the first works of the revolution, was considerably tempered by conversations resumed by President Paes with the Vatican in 1918. In 1919, a papal nuncio was appointed to Portugal, and in 1920 the Pope expressed himself as satisfied with the improved conditions.

Portugal's traditional friendliness with Eng-

land, her dependence on the latter for heavy importations of wheat and coal, and the fear entertained for the safety of the African colonies, led Portugal to affirm her obligations under the British treaty, in November, 1914. Troops were immediately despatched to Africa and contingents were sent throughout the War, 40,000 men seeing service in this area. In 1916, Portuguese troops entered the Kionga triangle and thus restored to their country a territory that had been seized by Germany in 1894. In 1916 German ships lying in Portuguese waters were seized (240,000 tons); Germany retaliated by formally declaring war on Mar. 9, 1916, and opening a severe submarine attack on shipping and ports. In 1917, shipping losses were particularly heavy. At first, the country's entry into the War served to unite all factions. A coalition ministry was erected and the royalists for a time stayed their intrigues to offer their patriotic services. Portuguese contingents saw action on the Western front in 1918, in all, 60,000 men taking part. At the Peace Congress, Portugal was represented, first by Dr. Egas Moniz, and later by Dr. Afonso Costa. Subsequent meetings of the Supreme Council restored the Kionga triangle to Mozambique and allotted Portugal 0.75 per cent of the German indemnity.

Portugal's participation in the War did not check internal disorders. In 1915, a mutiny of sailors resulted in the bombardment of Lisbon and the killing of 100 persons; Sr. Pimenta de Castro, the prime minister, was transported to the Azores; his successor was shot at, and resigned soon after; and this was followed immediately by the resignation of President Arriaga. These events were a prelude to the larger events of 1917. In December of that year, a revolution broke out in Lisbon and the fleet was fired upon. The purposes of the revolutionaries were for a more active participation in the War, and the resignation of the government which had antagonized the conservative classes. The result was the deportation of President Machado, the arrest of the premier, Dr. Afonso Costa, and the selection as provisional president of Maj. Sidonio Paes, leader of the revolt. On Apr. 28, 1918, Sr. Paes was elected by direct suffrage as president, though the republican parties refused to participate. By the support of the Catholics, whom he immediately propitiated, and the conservative elements, his powers at once became dictatorial. Parliamentary ministers were transformed into secretaries responsible to the president; all efforts were bent on the prosecution of the War, to the great approval of the Allies. But Sr. Paes, who might have restored Portugal to something like stability, was assassinated on Dec. 14, 1918, and the country was once more in a state of turbulence. In 1919, the uncertainty was capitalized by the monarchists who proclaimed a monarchy at Oporto under the regency of Captain Conceiro. The general rising of the marines and the radical elements made the royalist revolution short-lived so that after a few weeks of desultory fighting, Captain Conceiro was captured and the civil war ended. Ministry followed ministry in rapid succession. Adm. Canto e Castro, having followed Paes in the presidency, resigned in 1919; he was followed by Dr. José de Almeida. The railroad strike of 1920 embarrassed the government; the failure to cope with the pressing internal problems of taxation, the currency, public works, served to render the existing machinery useless. The counsel of former King Manuel to his followers, in 1920, to give up violence and resort to constitutional tactics only, had little influence on affairs. During 1921, Sr. Granjo, the prime minister, was killed as the result of another outbreak in Lisbon; and bomb outrages were frequent in 1921 and 1922. After eight ministries had held office for brief terms in 1922, a cabinet created by Sr. de Silva seemed to bear the stamp of permanency, for it lasted into 1923. But the election of the new president, Sr. Teixeira Gomez, in August, 1923, brought about a new ministry. The year 1923 saw a continuance of disturbances accompanied by bomb throwing, strikes, and rioting. Lisbon was once again fired on in December. A long drawn-out marine strike threatened to wipe the Portuguese flag from the high seas. As yet, there was in sight no surcease from the intestine strife which had prevailed, with distressing results, for more than two decades.

PORTUGUESE EAST AFRICA, or MOZAMBIQUE. A Portuguese colony on the east coast of Africa with an area of 427,713 square miles and an estimated population of 3,437,844 natives, 10,500 whites, 1100 Asiatics. In 1919, the Supreme Council awarded the province an area of 400 square miles, formerly part of German East Africa, known as the Kionga triangle. Capital, Lourenço Marques, had an estimated population of 20,000. Sugar, coconut palm, and sisal areas increased, particularly in the districts controlled by the Mozambique Company. Other products were rubber, ivory, wax, and various ores. The trade figures for 1913 and 1921 were, in escudos: imports, 12,678,000 and 39,812,313; exports, 5,346,000 and 26,117,513; reëxports, 8,935,000 and 42,055,947; transit, 34,044,000 and 135,393,526. Most of the transit trade was handled through the port of Lourenço Marques at which, in 1920, 618 vessels of 2,321,698 tons entered; of this tonnage, two-thirds was British. Costs of administration mounted during the period. In 1913–14, the budget balanced at 5,878,598 escudos; in 1922–23, at 16,300,835 escudos. (One escudo = $1.08 at par.) After 1913, the railway building was active due to the interest manifested by the British South African provinces because of their desire to utilize the Territory's ports. Some 160 miles along the route from Delagoa Bay to Inhambane were completed; the building of a line 170 miles long from Beira to the Zambezi was begun in 1920, and projects were under way for the development of the areas north and south of the Mozambique Company's holdings. The position of Portuguese East Africa became increasingly important after 1909 because the province served as the nearest outlet for the British South African products to the sea. Delagoa Bay in particular, being 100 miles nearer to Johannesburg than Durban, was favored, and the commercial facilities and social amenities of its city, Lourenço Marques, showed continual improvement. Coal-bunkering plants were erected as well as large wharves and docks. Through Delagoa Bay went much of the Transvaal's coal, copper, tin, asbestos, and maize. Shipping after 1914 was mainly in British and Portuguese hands. This economic relationship between the province and the British colonies accounted for the attention which Portuguese East Africa received from the home administration after 1910. The natives were subjugated and turbulent areas pacified, and Portuguese capital was invited to aid in the

province's exploitation. The result of the War put an end to the attempts of the German-controlled Nyasa Company to dominate the province. Great Britain, of course, then became the paramount factor.

PORTUGUESE WEST AFRICA. See ANGOLA.

POSEN. See POLAND.

POSITION INDICATOR. See ELECTRIC MOTORS IN INDUSTRY.

POSTGATE, JOHN PERCIVAL (1853–1926). An English philologist (see VOL. XIX). He was formerly a professor of Latin at Liverpool (1909–20). Among his latest works are an edition of *Lucan* (1917), *New Latin Primer* (1918), critical edition of *Phædrus, Fables* (1922); *Translation and Translations* (1922), and *Prosodia Latina* (1923).

POSTIMPRESSIONISM. See PAINTING and SCULPTURE.

POTASH. See FERTILIZERS.

POTASSIUM SALT. See CHEMISTRY.

POTATOES. The average annual production of potatoes in the United States, 1914–24, was 3,862,000 bushels. The largest acreage toward the close of the period, 4,384,000 acres, was harvested in 1917; and the largest yield, 451,185,000 bushels, was secured in 1922. Beginning with 1914, potato culture increased in the northern Mississippi Valley, especially in Minnesota and North Dakota; and several localities, particularly in western Nebraska, Idaho, and Colorado, became prominent in the production of the crop Latterly the production of early potatoes, which come upon the market about May 1, became an important enterprise in Florida. The growing of certified potatoes for seed also became an established industry, with an increasing annual production of such potatoes in a number of States and in Canada. Certified potatoes are grown by reliable parties in accordance with the rules and regulations for eligibility to certification in the various States. These requirements are, generally, freedom from varietal mixtures; conformity of tubers to the accepted type for the variety in shape, color, size, and characteristic markings; a fair degree of uniformity in size, and freedom from disease. The crop, as a rule, is inspected two or three times during growth. During the War, limited supplies and unsettled conditions led to the subjection of the international trade in potatoes to governmental regulation in many countries. In the United States all large potato dealers were under license to the Food Administration, and standard grades recommended by the Food Administration and the Department of Agriculture were prescribed from January 31 to Dec. 10, 1918. Use of the grades proved so satisfactory that it was continued voluntarily, and many States later passed laws establishing these or very similar grades as their official standards. As revised and effective July 1, 1922, the United States grades for potatoes comprise U. S No 1; Fancy; U. S. No. 1; U. S. No 1 Small; and U. S. No 2. These ratings are based on size, shape, uniformity, and the general absence of defective stock. In 1921 and 1922 low prices and high freight rates reduced shipments from many sections producing potatoes commercially, and these conditions added materially to the financial distress which befell farmers in the years following the War.

In the list of diseases attacking the potato plant hopperburn (or tipburn), spindling sprout, and mosaic caused trouble. Hopperburn, caused by the potato leaf hopper, is a blighting and drying up of the leaves during hot and dry seasons; spindling sprout is the production of weak and threadlike sprouts; and mosaic, long known in Europe, is a disease showing mottling of the leaflets with patches of light green. The Colorado potato beetle invaded Europe and became established in France and Belgium. This was suggested as possibly the result of the unusual war-time intercourse It was causing dismay in northern Europe, where potatoes form a large part of the average diet. Consult William Stuart, *The Potato. Its Culture, Uses, History, and Classification* (Philadelphia and London, 1923).

POTT'S DISEASE. See ALBEE, FRED HOUDLETT.

POUND, ROSCOE (1870–) An American lawyer and educator (see VOL. XIX). From 1913 he was Carter Professor of Jurisprudence and from 1916 dean of the Law School at Harvard University. He wrote *Lectures on the Philosophy of Free Masonry* (1915), and *The Spirit of the Common Law* (1921).

POWDER, SMOKELESS. See EXPLOSIVES.

POWELL, E. ALEXANDER (1879–1925). An American author and war correspondent, born at Syracuse, N. Y., and educated in Syracuse University and Oberlin College. During the War he was correspondent for daily papers in New York and London and for *Scribner's Magazine,* and served with distinction in the army. His books include: *The Last Frontier* (1912); *Gentlemen Rovers* (1913); *Fighting in Flanders* (1914); *Italy at War* (1917); *The Army Behind the Army* (1919); *The New Frontier of Freedom* (1920); and *Asia at the Crossroads* (1922).

POWELL, JOHN (1882–). An American pianist and composer, born at Richmond, Va., and educated in music in Vienna, where he studied from 1902 to 1907 with Leschetizky (piano) and Navrátil (composition). After his pianistic début in Berlin (1908) he played in Vienna, London, and Paris. In 1912 he returned to his native country and made his American début in New York He later made frequent appearances, chiefly as interpreter of his own works. While his compositions have titles suggesting classical forms, the contents and treatment are very free, so that the works give the impression of being improvised rather than logically developed. For his thematic material he made extensive use of negro melodies harmonized in the most modern fashion. His works comprise a concerto for piano and orchestra; a violin concerto; an overture, *In Old Virginia; Rapsodie Nègre* for piano and orchestra, and a string quartet. His piano works, almost exclusively in cyclical forms, include four sonatas (*Virginiancsque, Psychologique, Noble, Teutonica*) and two suites (*In the South* and *At the Fair*).

POWER, FREDERICK BELDING (1853–1927). An American chemist, born at Hudson, N. Y., and educated at the Philadelphia College of Pharmacy and in Strassburg. During 1880–83 he had charge of the chemical laboratories of the Philadelphia College of Pharmacy and during 1883–92 was professor of pharmaceutical chemistry and materia medica at the University of Wisconsin. In 1892 he became director of the laboratories of Fritzsche Brothers and in 1896 accepted an appointment in the Wellcome Chem-

ical Research Laboratories of London which he held until 1916 when he returned to the United States and was given charge of the phytochemical laboratory of the Chemical Bureau of the United States Department of Agriculture. His original researches were in connection with phytochemistry and with essential and fatty oils, especially the development of chaulmoogra oil as a remedy for leprosy. In addition to many scientific papers he was associated with F. Hoffman in the publication of the *Manual of Chemical Analysis* (1883).

POWER STATIONS. See ELECTRIC POWER STATIONS AND GENERATING APPARATUS; WATER POWER; STEAM TURBINES.

PRANDTL, LUDWIG (1875–). A German scientist in charge of experimental work on aërodynamics in the laboratory at Göttingen. He published with C. Wieselsberger and Dr. A. Betz *Ergebnisse der Aerodynamischen Versuchsanstalt zu Göttingen*, containing heretofore unpublished results of experiments, some conducted during the War, and some shortly after its termination. He is best known for the *Technische Berichte* included in his book.

PRATELLA, BALILLA (1880–). An Italian composer, born at Lugo. He was trained at the Liceo Rossini in Pesaro, taught at Cesena, and in 1910 became director of the Instituto di Musica at Lugo. He was one of the most active of the extreme futurists, both as composer and writer. He was the first to formulate the musical creed of the futurists, as early as 1915 (see MUSIC, *Recent Tendencies*). His writings, mainly attacks on established standards and institutions, offer nothing of constructive value. His compositions may serve as practical illustrations of his theories. He wrote the operas *Lilia* (Lugo, 1913), *La Sina di Vargoun* (Bologna, 1919), and *L'Aviatore di Dro* (Lugo, 1920); *Romagna*, five poems for orchestra; *La Guerra*, three dances for orchestra; *Inno a Vita;* chamber music, and pieces for organ and for piano.

PRATT, EDWARD EWING (1886–). An American commercial expert, born in Streator, Ill., and educated at Oberlin College (1906) and at Tulane University. For several years he was a Fellow of the Bureau of Social Research in the Russell Sage Foundation. From 1910 to 1912 he was assistant professor of economics and statistics at the New York School of Philanthropy. He was special investigator for important industrial and economic bureaus in New York City, and from 1915 to 1917 was chief of the Bureau of Foreign and Domestic Commerce in the United States Department of Commerce. From 1920 he was engaged in business. He lectured on foreign trade at Columbia University in 1921. His published writings include *Industrial Causes of Congestion of Population in New York City* (1911) and *Occupational Diseases* (1912), besides many articles on foreign trade and industrial betterment.

PRATT, JAMES BISSETT (1875–). An American professor of philosophy, born at Elmira, N. Y., and educated at Williams College and Harvard University. In 1905 he joined the faculty of Williams. With Santayana, Lovejoy, and others he published *Essays on Critical Realism* (1920). His other writings are concerned largely with the philosophy of the religious life. They include: *The Psychology of Religious Belief* (1907); *What Is Pragmatism?* (1909); *India and Its Faiths* (1915); *Democracy and Peace* (1916); *The Religious Consciousness* (1918); and *Matter and Spirit* (1922).

PRATT INSTITUTE. A nonsectarian, coeducational institution at Brooklyn, N. Y., founded in 1887, comprising Schools of Fine and Applied Arts, Household Science and Arts, Science and Technology, and Library Science. The entering enrollment for 1923–24 was 3722. The faculty consisted of 4 directors, 153 instructors, and approximately 65 lecturers. The library contained 109,098 volumes in 1914 as compared with 130,642 in 1923–24. President of the Board of Trustees and executive head of the institution, Frederic B Pratt; Secretary of the Board of Trustees, Charles Pratt

PRAY, JAMES STURGIS (1871–). An American landscape architect. In 1905–14 he was assistant professor of landscape architecture, and from 1914, Charles Eliot Professor, at Harvard University, and from 1908 chairman of the School of Landscape Architecture. From 1915 to 1920 he was Harvard adviser to the Cambridge Planning Board, meanwhile acting (1917) as city planning expert in laying out various army cantonments, and planning (1918) United States government towns for munition workers In 1920 he became chairman of the National Conference on Construction in Landscape Architecture. He was a member of many architectural societies and author of *City Planning*, with Kimball (1913).

PREFERENTIAL TARIFF. See BRITISH EMPIRE.

PREHISTORIC RACES OF MAN. See MAN, PREHISTORIC RACES OF; ANTHROPOLOGY.

PREKINDERGARTEN SCHOOLS. See EDUCATION IN THE UNITED STATES.

PRESBYTERIAN CHURCH. The Presbyterian Churches comprise 10 branches, as follows: Presbyterian Church in the United States of America; Presbyterian Church in the United States (South); Cumberland Presbyterian Church; United Presbyterian Church; Colored Cumberland Presbyterian Church; Welsh Presbyterian Church (Calvinistic Methodists, united in 1920 with the Presbyterian Church in the United States of America); Associate Reformed Presbyterian Synod; Reformed Presbyterian Church (Old School); Reformed Presbyterian Church, General Synod; and Associate Synod of North America (Associate Presbyterian Church) The Presbyterian and Reformed Churches represent those features of the Reformation emphasized by Zwingli and Calvin.

As a whole, the various branches of the Presbyterian Church showed marked growth in the years between 1914 and 1924. The total number of members in the United States increased from 2,083,617 in 1914 to 2,948,140 in 1922. The members and adherents of the Presbyterian and Reformed Churches throughout the world, all holding the presbyterian system, and organized in a World Alliance for purposes of fellowship and coöperation, increased during the period from 35,000,000 to more than 41,000,000, exclusive of the more than 5,000,000 Reformed Lutherans.

In this country the largest of the Presbyterian churches is the Presbyterian Church in the United States of America. Its membership increased from 1,458,085 in 1914 to 1,803,593 communicants in 1923, and the number of Sunday school scholars from 1,318,628 to 1,499,890. The number of churches dropped from 10,130 to 9706, and the number of ministers was

increased from 9536 to 9979. Contributions in 1914 totaled $27,681,970, and in 1923 $50,430,097. Of the total for 1914, $2,401,972 was contributed for home missions, $1,562,800 for foreign missions, $891,654 for education, and $19,771,059 for general congregational expenses; and of the 1923 total $5,386,459 was contributed for home missions, $3,892,627 for foreign missions, $1,624,373 for education, and $35,591,650 for congregational expenses. The denomination maintained 11 theological seminaries in 1914 and 13 in 1923. The reports of the Board of Foreign Missions showed a decrease between 1914 and 1923 from 27 to 26 foreign missions, but an increase from 165 to 166 stations, from 1226 to 1428 missionaries, from 5766 to 6856 native helpers, from 728 to 1027 fully organized churches, and from 133,713 to 178,299 communicants The number of mission schools fell from 2074 in 1915 to 2034 in 1920, and the number of students from 81,183 to 78,733, but the number of Sabbath school scholars increased from 183,656 to 232,321, and the number of hospitals and dispensaries from 165 to 175. In 1919, the church launched the New Era Movement, designed to cultivate the interest and support of the church for its missionary and benevolent enterprises. Among other things, this effort was responsible for the greater part of the increase in giving for the 10-year period as noted above. In 1923, all the missionary and benevolent agencies of the church were completely reorganized, 16 different boards and agencies being combined into four boards as follows: The Board of National Missions, the Board of Foreign Missions, both with headquarters at 156 Fifth Avenue, New York, the Board of Christian Education and the Board of Ministerial Relief and Sustentation, with headquarters at the Witherspoon Building, Philadelphia.

For many years the General Assembly by formal action favored the union of all the Presbyterian Churches in the United States. Conferences with members of the same ecclesiastical family resulted in the formation of the General Council of the Reformed Churches, by which cooperative work was being conducted (1924), and that with a view to ultimate organic union. In 1920 actual union with the Welsh Calvinistic Church was effected. In 1918 the General Assembly proposed a conference with all evangelical churches looking to a closer unity, but the bodies participating for the most part concluded that the unity desired, for the present at least, can be secured through the existing Federal Council of the Churches of Christ in America. Overtures for union with the Congregational Church were (1924) under consideration by commissions appointed by the two bodies.

The Presbyterian Church in the United States, often called the Southern Presbyterian Church, became a distinct denomination in 1861. It increased its membership from 310,612 in 1914 to 411,854 in 1923, its churches from 3430 to 3492, and the number of its ministers from 1819 to 2056. Its theological seminaries numbered four in 1915, and five in 1923.

PRICES. Changes in price levels, in distinction from changes in the cost of living, are measured customarily from differences in wholesale prices of certain commodities. The commodities usually selected are those which have been available in the markets in uniform grade for some period of time and seem likely to continue to be so available in the future. In the United States the more important index numbers for wholesale prices are those of the United States Bureau of Labor Statistics, the Federal Reserve Board, *The Annalist*, Bradstreet, Dun, and the somewhat different type of index number recently established by Prof. Irving Fisher. Price changes in Great Britain are shown by the index numbers of the British Board of Trade, *The Economist*, and *The Statist* (Sauerbeck). For Canada, we have the index number of the Dominion Bureau of Statistics; for Australia, that of the Commonwealth Bureau of Census and Statistics; for France, that of the Statistique Générale; for Italy, that of Prof. Riccardo Bachi; for Japan, that of the Bank of Japan in Tokyo. Index numbers of wholesale prices are available also in many other countries. While there is always some variation in the amount of change shown by different index numbers in the same country as well as by those for different countries, according to the kinds of commodities selected as the basis for the index number and the way in which the prices of these commodities happen to be affected by current market conditions, there was a surprising uniformity prior to the War in the price trend shown by the indexes then available. Following a world-wide increase in prices over many years, a decrease in prices began about 1873 in all countries and continued until about 1896. An upward movement then began and was still in progress in 1914.

With the many and varied economic disturbances caused by the War, the accurate measurement of changes in price levels became increasingly difficult. Prices of certain articles rose rapidly, others but slightly. Elaborate systems of price-fixing were established in many countries; fairly high prices were fixed in some instances to encourage production, and in other instances fairly low prices were fixed to check profiteering, both in connection with large sales to the government and its allies, and in connection with retail sales to consumers. The general effect of price control in the United States is illustrated by the following table showing index numbers for a large number of commodities brought under official control between August, 1917, and November, 1918, in comparison with other commodities left uncontrolled.

WAR INDUSTRIES BOARD INDEX NUMBER
Separated into Controlled and Uncontrolled Prices
(Average Prices, July, 1913, to June, 1914=100)

	Controlled prices (573 commodities)	*Uncontrolled prices* (793 commodities)	*All commodities* (1,366 commodities)
1913 Year	100	102	101
1914 Year	100	97	99
1915 Year	102	102	102
1916 Year	125	124	126
1917 August	204	162	187
September	205	163	186
October	198	167	182
November	200	172	183
December	193	174	182
Year	188	156	175
1918 January	195	178	185
February	198	180	187
March	197	182	188
April	196	187	191
May	192	189	190
June	189	191	189
July	195	194	193
August	199	195	196
September	204	199	201
October	201	201	201
November	200	200	200
Year	197	191	194

In the European countries especially closely affected by the War, price control began much earlier than in the United States; a large number of articles were usually covered, and all price rulings were carefully enforced. In all countries, however, whether or not there was price control, uniform tendencies were found in price trend, indicating the strength of the forces which control changes in price levels in all parts of the world. As between 1913 and 1914, almost no change in price level was shown. A significant and continued increase beginning in 1915 culminated about October, 1918. During the winter of 1918–19 there were slight and irregular fluctuations in prices, followed by a period of rapid increase, until the peak was finally reached during the summer of 1920. Prices then fell even more rapidly during a year and up to 1924 remained relatively stationary with slight tendencies toward small increases in most countries, the exception being in the price indexes of countries with a depreciating paper currency, where obviously a marked increase in prices in paper currency may be shown even when there has been a decrease in purchasing power in relation to a fixed monetary standard. The differences in the price indexes for certain countries before and after conversion to a gold basis are shown by the following price indexes of the Federal Reserve Board of the United States.

FEDERAL RESERVE BOARD WHOLESALE PRICE INDEXES

ON PAPER CURRENCY BASIS

Year	United States	England	France	Canada	Japan
1913	100	100	100	100	100
1919	211	241		207	235
1920	239	310	512	250	240
1921	149	198	344	167	181
1922	158	165	319	149	182
1923	164	170	394	150	188

CONVERTED TO GOLD BASIS

Year	United States	England	France	Canada	Japan
1913	100	100	100	100	100
1919	211	219	.	198	241
1920	239	233	187	223	242
1921	149	156	133	150	175
1922	158	150	136	147	175
1923	164	159	124	147	183

Although, as has been indicated above, a policy of price fixing was adopted during the War as a stimulus to production, there was little tendency to continue this policy longer than necessary for war purposes. This has been true also with reference to price fixing as a means of protecting purchasers from excessively high prices in relation to costs of production and distribution; every effort was usually made to restore as rapidly as possible earlier conditions of price control through free and open competition. The acute housing shortage in many countries necessitated the protection of tenants from rent increases until additional housing construction should have brought available supply of houses into closer relation to acute demand for housing accommodations. The rent restriction laws which were enacted in a number of European countries during or immediately following the War tended therefore to remain in force up to 1924. This is true also in the United States, where the New York Legislature voted almost unanimously in 1924 to extend until 1926 the emergency rent laws applying to certain cities where a housing emergency had been found to exist. In the District of Columbia also rent laws were in operation, but elsewhere in the United States little attempt was made after the War to control prices officially. See AGRICULTURAL CREDIT; FINANCE AND BANKING.

PRIESTLY, HERBERT INGRAM (1875–). An American educator and historian, born at Fairfield, Mich., and educated at the University of Southern California. He taught in California for several years and from 1901 to 1904 was a teacher and superintendent of schools in Luzon, P. I. Returning to the United States, he was superintendent of schools and teacher in California high schools until 1912, when he was appointed assistant curator of the Bancroft Library at the University of California. In 1920 he was librarian and also associate professor of Mexican history at that university. He wrote *José de Galvez, Visitor-General of New Spain, 1765–71* (1916), and many articles on Californian, Mexican, and Spanish-American history. In 1918 he was awarded the second Loubat prize at Columbia University for the best work on the history of North America during the colonial period. In 1920 he became editor of *The American Historical Review*.

PRIMITIVE MAN. See ANTHROPOLOGY.

PRINCE, MORTON. See PSYCHOLOGY, ABNORMAL.

PRINCE EDWARD ISLAND. The smallest of the Canadian provinces with an area of 2184 square miles. In 1911, the population was 93,728; in 1921 it had fallen to 88,615, or a decrease of 5.5 per cent The rural population was still preponderant though it declined as a result of the migrations to the cities; 84 per cent of the population was rural in 1911, and 78.5 per cent in 1921. Populations of the principal cities in 1921 were: Charlottetown, 12,347; Summerside, 3228.

Industry and Trade. Of the total 1,397,990 acres in the province, 1,216,483 acres were occupied as farms. Among the field crops hay and clover, oats, potatoes, and wheat received the most attention. Diversified farming, however, was the rule, the abundance of fodder crops making the live-stock industry particularly important. Stocks increased over the decade 1912–22 so that in the manufacture of butter and cheese the province was able to rank high in the whole Dominion. (In the manufacture of cheese it stood after Ontario and Quebec.) Total value for farm products was $15,929,000 in 1923. Fox breeding continued to be important and yielded about $1,240,000 in 1922 in pelts and live animals sold (pelts alone, $448,786). The fish catch netted $1,609,600 for 1922 as compared with $1,379,905 in 1913. Lobsters made up three-fourths of the total and were canned in local establishments. The vast oyster areas owned by the province had by 1922 still proved unsuccessful because of the importation of diseased oysters and the prevalence of pests. Manufacturing continued on a small scale. In 1921 the 446 establishments represented a capital of $2,452,826 ($2,013,365 in 1910), employed 1098 workers and added $1,575,684 by manufacture. Exports to foreign countries (1921–22) amounted to $415,870; imports for consumption to $954,549. In 1922, there were still 278 miles of railways, no construction having been done in the period.

Government. Revenues for 1922 were $748,888; in 1914 they had been $525,555. Expenditures for 1914 and 1922 were $445,396 and $687,-

241. Expenditures on education for 1913 were $261,641; for 1922, $428,869. Women were enfranchised and given the right to stand for the provincial assembly. Representation in Canadian Parliament: House of Commons, 4; Senate, 4.

PRINCE OF WALES. See EDWARD ALBERT CHRISTIAN GEORGE ANDREW PATRICK DAVID, PRINCE OF WALES.

PRINCETON UNIVERSITY. A nonsectarian institution for men at Princeton, N. J., founded in 1746. The enrollment increased from 1641 in 1914 to 2373 in 1922 when a limitation of number to about 2000 undergraduates was adopted owing to lack of housing and teaching equipment. In 1923, the total undergraduate and graduate enrollment was 2418. During the decade the productive funds of the university increased from $5,399,150 to $12,766,650; the faculty increased from 207 to 264; the library grew from 320,701 to 469,506. With the limitation of enrollment a selective process was instituted by which admission was based not only on scholarship but also on character.

Shortly after the outbreak of the War, voluntary military training was organized and in 1916 military science became for the first time a part of the curriculum. Summer camps were held in 1917 and 1918. The United States School of Military Aëronautics was opened in 1917, occupying four dormitories, the university dining halls and Palmer Physical Laboratory, and during its continuation until the Armistice 3714 cadets were registered, of whom 2458 were graduated. In 1918 the university came under government control through the Student Army Training Corps and the Naval Unit. In the same year the United States Navy Department installed in the Graduate College buildings a Navy Pay Officers School in which over 500 men were enrolled. A Radio Station of Research, a Bureau of Medical Research and a Bureau of the Sound Ranging Service of the Army occupied other university buildings, and extensive investigations in explosives and poison gases were conducted for the government in the chemical laboratory. Over 5500 graduates and undergraduates were in various branches of government service, upwards of 3000 being commissioned officers; 150 died in the War. Memorial scholarships were founded in the names of these men As a continuation of the Reserve Officers Training Corps maintained during the war period, a Reserve Officers Training Corps in Field Artillery was instituted after the War, commissioning selected students, on graduation, to serve as reserve officers in the United States Army.

The necessary reconstruction of the university on a more substantial financial basis led to a campaign for increasing its endowment. Of the $14,000,000 set as a goal, a total of $9,857,559 had been pledged and a sum of $7,513,593 collected by December, 1923.

The executive and administrative departments of the university were reorganized with a view to better coördination, and a system of cost accounting was installed, marking a new departure in university finance. Faculty autonomy and sympathetic coöperation between the board of trustees and the faculty developed to a degree remarkable in academic history. All questions of academic policy were discussed in joint council through a Conference Committee; a plan for systematizing faculty appointments, salaries, promotions, retirement and pension was in operation; the faculty had a voice in nominating its committees; representatives of the faculty sat with the Trustees' Committee on Honorary Degrees; and the rights of the individual in cases of dismissal were safeguarded. Student self-government made marked progress through the Student Honor Committee and the Committee on the Spirit of the Honor System and the participation of the Senior Council in matters of discipline. The Graduate Council was enlarged and a National Alumni Association centralized in one organization the 54 alumni associations in the country, the Council remaining the executive core of the new body The alumni trustees of the university were increased from five to eight, elected two each year by the alumni, to represent regional districts and to serve four years. President, John Grier Hibben, Ph.D., D.D.

PRODUCERS' COÖPERATION. See CO-OPERATION.

PROHIBITION. Prohibition is the term generally used throughout the United States to describe governmental prohibition of the manufacture, sale, and transportation of intoxicating beverages. As an outgrowth of the temperance and anti-saloon movements of many preceding decades, it became one of the outstanding issues of the decade since 1914. Many believe that prohibition by legislation and amendment was precipitated by the War. Federal or national prohibition is the culmination of various efforts to regulate and restrict the liquor traffic and is a sequence to cumulative local and State prohibition The term prohibition is being used to include activities similar to those just mentioned when they occur in other countries.

Local and State Prohibition. Prohibition early became effective through the exercise by communities of the privilege of "local option" in this matter, as extended to them through State legislation. In time, this local option extended to districts and to States; and until 1914 it was the prevailing form of prohibition in the United States. State-wide prohibition, by legislation and constitutional amendment, spread rapidly during the first few years of the decade 1914–24. At the close of 1913 only nine States had "gone dry." Eight of these, Maine, North Dakota, Kansas, Oklahoma, North Carolina, Georgia, and Mississippi, had adopted State-wide prohibition before 1910; West Virginia joined the procession in 1912. In some of these States the early enforcement legislation proved inadequate, and the States did not have what was commonly called "bone-dry" legislation until a later date. In Georgia, for instance, a State prohibition law was enacted in 1907 and became effective in 1908, but the enforcement was lax until more drastic prohibition legislation, passed in 1915, became effective in 1916; and even after this a so-called bone-dry law was passed in 1917 at a special session of the Legislature called to consider this issue. In 1914, four more States, Colorado, Oregon, Virginia, and Washington, brought the total to 13; and in 1915, three more States, Alabama, Arizona, and South Carolina, made the total 16. Alabama had enacted statutory prohibition in 1909 which was practically repealed in 1911 and reënacted in 1915. In 1916, seven additional States, Arkansas, Idaho, Iowa, Michigan, Montana, Nebraska, and South Dakota, made a total of 23, one less than half the number of States in the United States, but principally the less densely populated southern and

western States. In other States there had been a rapid extension of local prohibition under local option so that some of these States were half and a few three-quarters dry territorially. All of this occurred before the United States entered the War in 1917. State-wide prohibition continued to spread steadily, and before the Federal amendment had become effective in 1920, State-wide prohibition had carried in 10 more States. Four of these, Indiana, New Hampshire, New Mexico, and Utah, went dry in 1917; four, Florida, Nevada, Ohio, and Wyoming, in 1918; and two, Kentucky and Texas, in 1919. The amendments and legislation in many of these States did not become effective until the year following its adoption, and in several cases not until the second year thereafter. Prior to the time that the national prohibition amendment became effective, 33 States had adopted some form of State-wide prohibition, and many of the States had supplemented their early legislation with bone-dry legislation. It has been estimated that the dry territory at this time contained about two-thirds of the population of the United States, for some of the more densely populated States, so far as State legislation was concerned, remained "wet" until they came under Federal prohibition. Considerable sections of these 15 wet States were, however, under local prohibition. In 21 of the 33 dry States, the issue had been decided by popular vote, and in 12 by the respective State Legislatures.

Federal Prohibition Legislation. Federal action on this issue began in 1913 when the prohibitionists attained a majority in Congress, which up to 1924 they had never lost. The first act was the passage of the Webb-Kenyon Inter-State Liquor Shipment Act over the veto of the President of the United States. This act made illegal the shipment of liquor from a wet to a dry State. Although President Taft vetoed the bill because in his opinion it was unconstitutional, the Supreme Court handed down a decision (Jan. 8, 1917) upholding its constitutionality. Shortly after this decision, the Alaska Prohibition Act and the Porto Rico Prohibition Referendum were passed. The former placed Alaska under prohibition, the citizens of that Territory having expressed their preference in a vote in 1916. The latter provided for a vote on the matter in Porto Rico, and at a special election (July 16, 1917), prohibition was adopted, the legislation becoming effective Mar. 2, 1918. On Mar. 3, 1917, the President signed the District of Columbia Prohibition Bill which became effective Nov. 1, 1917. As a result of activities led by Senators Reed and Jones and by Representative Randall, there were passed as amendments to the Post Office Appropriation Bill provisions whereby the United States mails were closed to all advertisements of the sale of alcoholic beverages, including letters or newspapers containing the same, when addressed to any person, firm, corporation, or association in any State or Territory where the sale and manufacture of intoxicating liquors had been prohibited. These amendments included what was in effect an extended and more definite statement of the intent of the Webb-Kenyon Act. This legislation was also approved by the President on Mar. 3, 1917. In 1919 Senator Sheppard added an amendment to the revenue bill under consideration by the Senate, which, being adopted, made these Reed-Jones-Randall provisions effective with respect to the District of Columbia. During the War a number of emergency measures, restrictive and prohibitive, were passed, aiming to conserve the food and fuel supply and to protect the efficiency of the army and navy and of the workers in the war industries. Among these was the War Prohibition Act, passed Nov 21, 1918, and effective in July, 1919, which forbade until demobilization had been completed the sale for beverage purposes of distilled, malt, or vinous intoxicating liquors. This act continued to function until the Eighteenth Amendment became effective.

The Eighteenth Amendment. The general movement for Federal prohibition registered itself in 1914 when a resolution proposing a constitutional amendment received a majority vote in the House, and in 1916 when such a motion was reported by committee in the Senate. A resolution submitting to the States a national prohibition amendment to the Constitution of the United States was adopted by the Senate on Aug. 1, 1917, by a vote of 65 to 20, and passed with slight amendments by the House of Representatives on Dec. 17, 1917, by a vote of 282 to 128. The day following, the Senate concurred, and the resolution was adopted. The article of the joint resolution which is now Article XVIII of the Amendments to the Constitution was and is as follows:

1. After one year from the ratification of this article the manufacture, sale or transportation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof, for beverage purposes, is hereby prohibited.
2. The Congress and the several States shall have concurrent power to enforce this article by appropriate legislation.
3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the Legislatures of the several States, as provided by the Constitution within seven years from the date of the submission hereof to the States by the Congress.

The Legislatures of the necessary three-fourths (36) of the States had ratified the amendment on Jan. 16, 1919. The ratification was proclaimed by the Secretary of State on January 29. Since that time 10 additional States have ratified. The States that have not ratified are Rhode Island and Connecticut.

Federal Enforcement Legislation. The National Prohibition Act, commonly known as the Volstead Act, was passed by Congress and submitted to the President, who vetoed it on Oct. 27, 1919. The same day the House voted to pass over the veto: yeas, 176; nays, 55; answering present, 3; not voting, 197. The next day the Senate voted to pass over the executive veto: yeas, 65; nays, 20; not voting, 11. This act fixed one-half of 1 per cent as the maximum of alcohol in nonintoxicating beverages. It placed responsibility for enforcement with the "Commissioner of Internal Revenue and his assistants." They were to "investigate violations" and to "report to the local United States Attorney," who must "prosecute offenders under the Attorney General's direction." The law provided for drastic enforcement of the amendment and established strict regulation of the distribution of liquor for the few specific uses permitted by the law. The United States Supreme Court on June 7, 1920, in a unanimous decision sustained the validity of the Eighteenth Amendment and of the Volstead Act.

The Enforcement Unit. The Prohibition Unit is a complex body with ramifications through the executive departments. Its organization has been much criticized on this score

and the consequent possibilities of "passing the buck." It has been defended on the count that all these agencies are needed for approaches to effective enforcement. The Federal Prohibition Commissioner is under the Commissioner of Internal Revenue, who is under the Secretary of the Treasury, who derives his policies from the President of the United States. He works with postal inspectors, the Bureau of Investigation of the Department of Justice, the Secret Service of the Treasury Department, the internal revenue officers in charge of income tax, custom officers and the Coast Guard. The principal weakness lies in the fact that the apprehension of violators is in one government department, and their prosecution is in another. This division of responsibility raises obvious questions as to efficiency

Adjustments of State and National Regulation. Prior to the decade 1914–24, prohibition enforcement had been a right and privilege of the several States. The provision of "concurrent power" in prohibition of alcoholic drinks and narcotics brought up some very involved problems of adjusting the relations of two governments acting in legal independence in the same territory. The repeal of the New York prohibition law 87 caused considerable stir and left that State with only the Volstead Act as a means of enforcing the Eighteenth Amendment. Nevada, having repealed her old acts, was embarrassed when her Supreme Court declared her new act unconstitutional and thus left her in much the same plight as New York. Among the most interesting adjustments of State law are the following. Pennsylvania defines as intoxicating beverages those so declared by "Acts of Congress passed . . . from time to time." In Illinois, if death results from poisonous liquor sold "for beverage purposes" the sale is murder. Similar legislation has been passed in Oklahoma and Tennessee, and in Iowa the sale or giving is manslaughter. Oregon 180 opens the State courts to abate nuisances under the national act, and either State's attorneys or Federal officers may prosecute. One of the most conspicuous incidents of Federal-State-municipal coöperation was in Philadelphia, where Governor Pinchot, Mayor Kendrick, and General Butler effected a signally drastic enforcement.

Anti-Saloon League of America. The agency more responsible than any other for leadership in the State and national prohibition legislation during the decade was the Anti-Saloon League of America. Organized in May, 1893, it is frequently described as "the church in action against the saloon." It is properly credited, both by its friends and its enemies, as having been chiefly responsible for the rapidly increasing sentiment in favor of prohibition. It is organized by States and acts as an agent for the churches in matters concerning the annihilation of the liquor traffic. The League established national propaganda headquarters at Washington, D. C., in 1915, and in 1916 it launched the national campaign for the amendment of the Federal Constitution. It has kept corps of trained men at the national and at State capitals to represent its constituency. It has examined the practices of representatives of the people and inquired into the attitude of candidates for public office, insofar as these related to prohibition, and opposed those who did not, regardless of party affiliation. Since the adoption of the Eighteenth Amendment and the passage of the Volstead Act, it has turned its energies to the difficult task of promoting law enforcement, to project a programme of Americanization, and to carry on the work of prohibition in foreign countries. For the latter purpose, the World League against Alcoholism has been formed. The avowed purpose of the new organization is "to attain by means of education and legislation the total suppression throughout the world of alcoholism." It pledges itself to "avoid affiliations with any political party as such, and to maintain an attitude of strict neutrality on all questions of public policy, not directly and immediately concerned with the traffic in alcoholic beverages."

Opposition. There has been much opposition ranging from unreasonable pressure of self-interest to rational judgments concerning the best interests of public welfare. Among the latter are the "laissez-faire" group who generally oppose governmental control, those who oppose all laws tending to fix status, those who oppose Federal action in what has been hitherto a States' right, those who oppose the use of the Federal Constitution for what they regard as a legislative function, and those who are opposed to the Volstead Act as a method or as an interpretation of the amendment. Henry W. Jessup stated that "if the Federal government has the right to make a sumptuary law of any description, it will have a right to make sumptuary laws of every description" President Nicholas Murray Butler of Columbia University claimed that "the amendment introduces for the first time a specific and almost unamendable and irrepealable police regulation into a document whose purpose was to set up a form of government and limit its powers." He further said that it is generally admitted that "the Amendment itself is not only a violation of the principles on which our government rests, but a revolutionary departure from them." There is also considerable popular opposition which hangs on to slogans and shibboleths, many of which have little or no basis in fact and are principally clever inventions of propagandists.

Labor Attitude. The American Federation of Labor, "as the spokesman of the unorganized as well as of the organized toilers," published a statement that it had been "decided by unanimous vote in its convention held in Denver in June, 1921, that the Volstead Enforcement Act must be modified so as to promote the manufacture and sale of beer and light wines." They claimed the act to be "an improper interpretation of the prohibition amendment—a social and a moral failure—a dangerous breeder of discontent and of contempt for all law" In a poll, however, of 526 labor leaders taken by *The Literary Digest* in March, 1920, 345 voted that prohibition was a benefit to the workingman, 143 voted that it was not, 31 were doubtful, and 7 claimed that it had not had a fair trial.

Social and Economic Consequences of Prohibition. Many statistics have been compiled in order to prove both the good and the ill effects of prohibition. Coming as it did at the close of the War, when all the social and economic factors were disturbed and all indices were turbulent, it is difficult to prove just what are postwar and what are postprohibition reactions. The very careful studies compiled by the Research Department of the Federal Council of Churches of Christ in America are the most significant available. The

studies have included an analysis of crime, deaths from alcoholism and cirrhosis of the liver, alcoholic psychoses, drunkenness, savings, poverty and relief, and all the other vital social changes which might have been consequences of prohibition Although the period of time is short, the data limited and not too good, and the researches as yet far from complete, there seems to be a "typical curve" of beneficial effects, especially in the northeastern industrial and densely populated areas most affected by national prohibition. This "typical curve" seems to indicate a maximum benefit from prohibition in 1920 and a regression of benefit since that time but not as yet a regression to preprohibition conditions. It is presumed that this regression was in part due to increased traffic in and consumption of alcoholic beverages.

Law Observance Campaign. This tendency toward disregard of the prohibition laws, together with a general tendency to regard all law more lightly, called forth protests and various demands for the observance of law and order. The outstanding activities were those inaugurated by the Citizenship Conference held in Washington, D. C., in October, 1923. Called by Fred Smith, one of the secretaries of the Federal Council of Churches, it assembled delegates who represented nearly every phase of religious, educational, social, and welfare organizations, as well as commercial and labor bodies It opposed the alleged prevailing tendency toward disregard of law and the unique attacks on the Eighteenth Amendment and Volstead Act which tended to nullify them. This body organized permanently as the Citizenship Committee of One Thousand.

Effects of Prohibition. It was impossible in 1924 to record many, if indeed any, of the permanent important social changes that have resulted from the adoption of prohibition as a national public policy. Considerable time is required before the more fundamental social and economic changes consequent on so extensive a social adjustment properly register themselves. Observations at this time were necessarily limited to the consideration of the most immediate and perhaps the least significant effects. Any attempt to appraise properly the more remote effects must be based on opinions of estimable men concerning these probabilities. In respect to the more immediate effects, it was generally conceded that there was little trustworthy evidence available and that most of the so-called evidence was more nearly propaganda or was at least colored by "wishful thinking," however honestly it might have been intended. It is very worth while to inquire as to the effect which the prohibition activities have actually had on the consumption of alcoholic beverages. Until the facts regarding consumption are established it is difficult to draw conclusions as regards changes due to diminished consumption.

The Consumption of Liquor since Prohibition. The consumption of liquors has been of two sorts, legal and illegal. The former covers especially consumption for medicinal and sacramental purposes and conversion for industrial alcohol The latter included irregular withdrawals from warehouses, domestic manufacture, and smuggling The facts regarding the withdrawal of bonded liquors from bonded warehouses are comparatively definite. The "peak" of the annual withdrawals of liquor of this sort occurred in 1917, during which year 160,000,000 gallons were taken out of bond. In 1923 about 11,000,000 gallons were thus withdrawn. At the beginning of the decade there were 285,000,000 gallons in bond and in 1923 but 45,000,000. It is self-evident that this source of supply could not long continue, and the activities of the Enforcement Unit were operating to make more difficult the removal of the balance for illicit purposes The commercial manufacture of high alcoholic drinks seemed to have been abandoned by almost all of those engaged in this business prior to 1920. The consumption of beer is quite another matter. Prior to prohibition, beer constituted by volume 90 per cent of the liquor consumed in the United States The American Brewers' Association estimated that the total 1924 production of beer was about 20 per cent of what it formerly was, and there are reasons for believing that this is a fairly liberal estimate Creditable estimates place the number of brewers brewing "beer substitutes" at about one-third of the number of preprohibition brewers. Some of these claimed to be operating at a loss, with a hope that the one-half per cent maximum alcoholic content fixed by the Volstead Act might be raised. Many breweries were manufacturing "near beer," advertised as "brewed exactly as before." It was made exactly as before, but the excessive alcoholic content had to be distilled off before the beer left the breweries. An exact check-up of this latter process presented many difficulties, and even when it was accomplished, consumers and "bootleggers" contrived in various ways to restore the alcoholic content

"Home-brew" activities spread rapidly. All efforts to gauge their extent in the aggregate were relatively futile. The various studies made of the consumption of commodities essential to home brew, such as malt, rye, hops, yeast, etc., and of the sale of apparatus for the purpose, were full of errors and of doubtful hypotheses. There was much illicit manufacture of wines. This was somewhat reflected in the enormous traffic in grapes, which, however, must be considered also in relation to the general increase in the traffic in fruits and the increased use of grapes for unfermented grape-juice products. The Secretary of the United States Brewers' Association estimated that the shipments of grapes from California, New York, Michigan, and Pennsylvania in 1922 would make over 1,250,000 gallons of wine. There were many ramifications of these activities, some of which were merely more extensive activity in ancient practices such as the making of hard cider and of "apple-jack." Many prominent social workers were inclined to look on these activities, especially home-brewing, as temporary reactions; novelties which were troublesome, expensive, a general nuisance, and which at best yielded unsatisfactory products of amateurs They did, however, furnish a very considerable supply of alcoholic beverages for local consumption.

The manufacture of synthetic liquors, commonly called "hootch," resulted in much sickness and many deaths. About 80,000 samples of alcoholic liquors were examined during the year 1922–23. In his report to the Prohibition Commissioner dated Apr. 24, 1923, Dr. Doran, head of the industrial alcohol and chemical division of the Prohibition Unit, stated that "it is noticeable that the percentage of genuine whisky in all the samples examined in our

laboratories is not as great as it was nine months or a year ago, and I now find that of 5000 samples of distilled spirits submitted to the laboratory during the last six months not over 50, or 1 per cent, are genuine whisky." Smuggling activities along the Atlantic coast and over the Canadian border served as a source of supply for a lively bootlegging industry in the northeastern section of the United States. This fact was generally admitted by both the enemies and friends of prohibition. It was of course difficult to estimate the extent of these activities. The business seemed to be of such size as to absorb the heavy losses which came through frequent large seizures and consequent penalties. In 1918 importations of spirituous liquors into the nearby Bahama Islands was negligible; in 1920 it amounted to 160,000 proof gallons, and data compiled by the British Premier made it about twice that amount for 1922, a rather good supply for a very small base. Enforcement officials looked for a reduction in smuggling as a result of treaty arrangements and a breaking-up of the "rum row" by the strengthening in size and speed of the Coast Guard as a result of appropriations made by Congress on Apr. 2, 1924. A convention signed with the Canadian government in June, 1924, arranged for cooperation in suppressing illicit traffic in liquors and narcotics between the two countries.

Research. In no issue of its size before the public was it so difficult to obtain accurate, comprehensive information in regard to social and economic consequences as in this. Researches of the Federal Council of Churches revealed a distressing paucity of unprejudiced data. An extensive and intensive research for the enlightenment of public opinion on the immediate and probable remote effects of prohibition was needed

Liquor Regulation in Other Countries. In Canada, some of the provinces had prohibition; some, regulation. Prohibition was in effect in 1924 in Prince Edward Island (1907); Saskatchewan (1915); Alberta and Nova Scotia (1916); New Brunswick and Newfoundland (1917); Yukon Territory (1920) British Columbia adopted prohibition in 1916 and changed to state control in 1921; Manitoba adopted prohibition in 1916 and state control in 1923; Ontario went dry in 1916 and adopted state control in 1919; Quebec had government control. In England during the War the liquor traffic had been variously regulated, in zones about army and navy stations, and where war material was being handled; in 1921 a bill imposing somewhat similar restriction was enacted, for the country as a whole, to regulate hours of sale and alcoholic content of hard liquor. National prohibition was defeated (Apr. 20, 1923) in the House of Commons by a vote of 236 to 14. Finland, after having its prohibition legislation twice annulled by the Czar under the old régime, in 1917 again passed a prohibition law, effective in 1919. In Norway, as a result of a referendum in 1919, traffic in liquors containing over 14 per cent of absolute alcohol was forbidden; but following the threat of France, Spain, and Portugal to bar the fish products of Norway if her wine importation were cut off, the alcoholic content in 1923 was raised to 21 per cent. For a similar reason, Iceland's national prohibition act of 1908 also was suspended temporarily, in 1922, to allow the admission of liquors containing up to 21 per cent of alcohol from Spain. Local option obtained in parts of Holland, Belgium, Scotland, Poland, and Denmark (where a uniform local-option bill failed in the upper house in 1919); and some measure of regulation was being exercised in Germany, Austria, Northern Ireland, Japan, Mexico, and many South American countries. Federal control and taxation of liquor was defeated in Switzerland in 1923; and in that year, according to reports, the Turkish Empire adopted nation-wide prohibition. The prohibition of the liquor traffic in Russia during the War did not apply to the light wines of the southern regions, which were subject to local veto; and certain phases of the vodka trade were afterward reestablished as a government monopoly.

National and International Temperance Organizations. The following bodies were permanently organized for the promotion of temperance and the prevention of alcoholism: World League against Alcoholism; World's Woman's Temperance Union; Permanent International Congress on Alcoholism; International Order of Good Templars; Sons of Temperance; World Student Federation against Alcoholism; Intercollegiate Prohibition Association; World Prohibition Federation; National Temperance Council; National Legislative Conference; Scientific Temperance Federation; National Temperance Society; International Reform Bureau; Woman's Prohibition League of America; Committee of One Thousand In addition there are the various boards of churches and church federations. See LAW, PROGRESS OF THE.

PROJECTILE. During the War, several new types of shell were given trials; some seemed likely to come into general use. T.N.T. (trinitrotoluene) became the explosive generally used in the bursting charge in place of picric acid compounds and gunpowder. (See EXPLOSIVES.) The use of common shell with thin walls and extra heavy bursting charge, in fleet action, was practically given up. The nonricochet or "diving" shell, so designed that it would even at a low angle of impact enter the water and nearly maintain its aërial direction, was devised for use against submarines, and the models brought out near the close of the War were efficient The gas shell, so effective in land operations, was little used at sea, although gas shell and aërial gas bombs are likely to be important features of naval warfare in the future unless barred by international agreement. Illuminating shells were used to some extent and were generally adopted as a necessary naval equipment. They may be fitted to burst in the air or on contact with the water and illuminate nearby objects. Smoke shell, producing a large volume of dense smoke, have a limited usefulness Anti-aircraft shell, fitted with night and day tracers giving out visible lines of fire or smoke, were still undergoing improvement in 1924. Gas, explosive, and depth bombs (see BOMB, DEPTH, and BOMBING OF VESSELS) are partly projectile in character and seemed to have an ever-increasing field of usefulness. See GUNS, NAVAL; ARTILLERY; ORDNANCE.

PROKOFIEV, SERGEI (1891–). A Russian composer, born at Sontsavka in southern Russia Having received his first instruction from his mother, he entered the Petrograd Conservatory in 1904 and studied piano with Essipov and composition with Liadov and Rimsky-Korsakov. Graduating in 1910, he won the Rubinstein prize. He made several tours as a

pianist, appearing in the United States in 1918. As a composer he belongs to the extreme futurists. His works include the operas, *Maddalena, The Gambler* (Petrograd, 1916), and *Love for Three Oranges* (Chicago, 1921); a ballet, *Le Bouffon;* a *Sinfonietta;* a symphonic poem, *Dreams; Scythian Suite* for orchestra; a *Classical Symphony;* a violin concerto; two piano concertos; *Conjurements* for soli, chorus, and orchestra; and miniature bits for piano and songs.

PROLETKULT. See ÆSTHETICS.

PROPERTY. See LAW, PROGRESS OF THE.

PROTEINS. See FOOD AND NUTRITION.

PROTESTANT EPISCOPAL CHURCH. In doctrine this religious body is similar to the Church of England, from which it is descended. It recognizes three orders in the ministry—bishops, priests, and deacons; the diocesan bishops are elected by the clerical and lay members of the convention of the diocese. The number of communicants of the denomination grew steadily from 1,015,248 in 1914 to 1,143,801 in 1923, the number of clergy from 5538 in 1915 to 6024 in 1923, the number of Sunday school pupils from 462,221 to 476,375, and the number of teachers and officers from 52,534 to 53,992. The number of parishes increased from 8098 in 1918 to 8242 in 1923. At the General Convention in 1919, a new canon was adopted providing for the organization of a permanent executive body, called the Presiding Bishop and Council. In 1922, the name was changed to National Council. Among other things, this council was to exercise all the powers of the Domestic and Foreign Missionary Society, and have charge of the unification, development, and prosecution of the work of missions, church extension, religious education and Christian social service. However, the Missionary Society retained its corporate existence and continued to receive and hold bequests, trust funds and title to property of all kinds. In the United States, the church carried on extensive work among the Indians, the negroes, the southern mountaineers, and the foreign-born, while work with deaf mutes, and in rural and industrial centres, became increasingly effective. The church's influence was also felt in the remote parts of the republic—in Alaska, the Philippines and the Hawaiian Islands, the Canal Zone and the possessions in the West Indies. Abroad, work was carried on in China, Japan, Liberia, Mexico, Brazil, Cuba, the Dominican Republic, and Haiti. In 1919, a movement, known as the Nation-Wide Campaign, was inaugurated, the purpose of which was to increase interest in the missionary work of the church at home and abroad. One result of this movement was that the giving of the church for all purposes was in 1920 more than $10,000,000 larger than in 1919 and grew larger each year thereafter. See REFORMED EPISCOPAL CHURCH.

PROUST, MARCEL (1873–1922). One of the leading French writers of the twentieth century, born in Paris. Proust, like his fictional hero Swann, was a man of the world and seemed to his friends to be nothing more than a man of the world with perhaps an amateurish interest in letters. At the age of 45, Proust had published only two French translations of Ruskin, *The Bible of Amiens* and *Sesame and Lilies*, and an original volume, *Les Plaisirs et les Jours* (*Delights and Days*). It was in the preface to the latter volume that Anatole France indicated that Proust "delights equally in describing the desolated splendor of the setting sun and the agitated vanities of a snobbish soul." A man of feeble constitution, Proust alternated his mundane parties with seclusion in an invalid's bed. It was thus that he prepared himself to be the fictional Saint-Simon of French society of the *fin de siècle*. In 1914 he began the publication of his fictional notebooks, an 11-volume novel, *A la Recherche du Temps Perdu* (*In Search of Days Gone By*). Four or five additional volumes, which he had completed but not corrected at the time of his death, remain (1924) still to be published. Public attention was attracted to Proust's work in 1919 when the section of his novel called *A l'Ombre des Jeunes Filles en Fleurs* (*In the Shade of Budding Young Girls*) won the Prix Goncourt. He was hailed immediately as an eccentric literary genius who wrote from imaginative reminiscence instead of from imaginative construction. He described his literary method in the *Coté de Guermantes*. For reference consult Lalou's *Histoire de la Littérature Française Contemporaine*, pp. 630–645 (1923).

PROVIDENCE. The capital of Rhode Island, and the second city of New England. The population increased from 224,326 in 1910 to 237,595 in 1920 and to 242,378 by estimate of the Bureau of the Census for 1923. An extensive plan for improvement of the port was started in 1918. The city appropriated $800,000, the State $1,500,000, and the Federal government $1,000,000 to have the harbor deepened and a straight thirty foot channel dredged to deep water. The State built a large pier with a two story steel shed 400 by 100 feet, and the city built a quay 3000 feet long in thirty feet of water at mean low tide, equipped with complete freight handling apparatus and railroad connections. The new Scituate Reservoir was built with a dam 3200 feet long and 100 feet high. A seven-mile aqueduct brought the water to a new filtration plant. A zoning ordinance was adopted in 1923.

PRUSSIA. In the early part of 1914 there was a good deal of protest on the part of the Prussian Conservatives against the imperial policy of Bethmann-Hollweg, which they alleged worked to the prejudice of the position of Prussia in the Empire. The appointment of the Prussian Minister of the Interior, Von Dallwitz, to the post of Statthalter of Alsace-Lorraine removed the most violent opponent of Prussian Franchise Reform. But the sanguine hopes which had been placed on his successor, Von Loebell, were soon shattered by the latter's inaugural speech in the Diet, in which he stated that he had no intention of drawing up a Franchise Bill. The outbreak of the War temporarily forced all internal questions into the background, but the problem of internal reform in Prussia could not long be ignored. During the budget debates in the Diet of March, 1915, the Poles and the Danes abstained from voting and at the same time voiced their protest against the repressive measures which the government had seen fit to continue against these nationalities in spite of their unquestionable loyalty in the War. At the same time the Socialists voted against the Prussian budget because of the unwillingness of the government to grant a democratic franchise and the right of free combination to the masses. The Prussian war measures dealing with the economic situation were similar to and worked in complete harmony with

the corresponding imperial measures. On Jan. 13, 1916, the Chancellor appeared before the Prussian Diet with a promise of electoral reform, but stated at the same time that it must be deferred until the end of the War. The government was forced, however, to abandon this position as a result of the changes in the foreign and internal situation during 1916 and 1917 and particularly in consequence of the ever-growing opposition of the Reichstag majority. Hence the more liberal Hertling government, installed late in 1917, introduced during November of the same year reform measures which, while making certain progress in regard to electoral reform, curtailed substantially the rights of the Lower House in the matter of the budget. After much wrangling the bill was finally adopted on Oct 24, 1918, but then the situation had gone too far to be capable of being remedied by mere electoral reform.

The revolution of November, 1918, did away with the dynasty, Prussia's position of hegemony in Germany, and the personal union between the German and Prussian governments. A republic was proclaimed, the House of Lords was abolished and the Lower House dissolved. On Nov. 15, 1918, a ministry, consisting for the most part of Socialists, was appointed by the Executive Committee of the Workers' and Soldiers' Council. The result of the elections for the Constituent Assembly on Jan. 26, 1919, was as follows: Majority Socialists, 145; Independent Socialists, 24; Centre, 88; Democrats, 65, German People's party, 21; German National party, 50; Hanoverians, 7. The revolutionary period proper ended with the convening of the Assembly on March 13 and the promulgation of a provisional constitution. Thereupon the Socialist Hirsch formed a coalition cabinet, consisting of Socialists, Centrists, and Democrats, which was succeeded after the Kapp Putsch in March, 1920, by a similarly constituted coalition ministry under the Socialist Braun. The new constitution of Prussia was completed by the Assembly after many difficulties on Mar. 30, 1920. It was drafted under the decisive influence of the constitution of the Reich and merely carried out the instructions of the latter. In it the attempt was made to bring about closer union with the Reich and far-reaching decentralization within Prussia. When the elections for the Diet in February, 1921, resulted in a strengthening of the extreme Right and Left, the formation of a new ministry was made very difficult and only on April 22 did the Centrist Fehrenbach succeed in forming a coalition of Centrists, Democrats, and experts. In the Braun ministry of November, 1921, this coalition was broadened so as to include the Socialists and the People's party During the last years of the period 1914–24, Nationalism and Communism grew apace in Prussia as in all other parts of the Reich. In March, 1923, Minister of the Interior Severing dissolved the activist organizations of the Monarchists and prevented the Communists from forming "fighting unions." In the early fall of the same year an insignificant and unsuccessful Monarchist coup was attempted in the fortress of Kuestrin in Brandenburg.

Prussia suffered severely under the Peace Treaty of Versailles. She lost the province of Posen, the larger part of West Prussia, parts of East Prussia, Silesia, Schleswig-Holstein, and the Rhine Province, in all 56,000 square kilometers with approximately 4,700,000 inhabitants. The conditions resulting from the Peace Treaty, the antagonism of the provinces to the Berlin government, old particularistic aspirations, and the intrigues of the French, combined to bring about during the first years after the Armistice various movements aiming at the separation of individual provinces from Prussia and the breaking up of the state into several states within the Reich. By cleverly making use of an old Rhenish distaste for things Prussian, the French endeavored for a long time to create an independent Rhenish buffer state and after lavish expenditure of money and much effort succeeded finally in the fall of 1923 in setting afoot with the help of all sorts of disgruntled and disreputable elements a Rhenish Separatist movement. The Separatists found very little response among the Rhenish population and were protected from the wrath of the Rhinelanders only by French and Belgian bayonets. Once the support of the armies of occupation had been withdrawn the movement quickly collapsed As a defense measure against Separatism, the Rhenish people organized a movement for an autonomous Rhenish state within the Reich The portion of Upper Silesia which remained German voted to form, as heretofore, a part of the Province of Silesia and of the State of Prussia instead of becoming, as had been the offer, a separate Prussian province or an autonomous state. The prolonged clamor of the Hanoverian autonomists induced the Prussian government to give the question of autonomy for Hanover a test and hence instituted, in the spring of 1924, proceedings in conformity with the provisions of the constitution of the Reich to bring about a plebiscite. Upon the failure of initiative petition to receive the required indorsement of the people, the matter was abandoned for the time being No doubt the feeling that in view of Rhineland Separatism the time was not propitious for such a plebiscite was largely responsible for the unfavorable verdict.

PRZEMYSL, BATTLES OF. See WAR IN EUROPE, *Eastern Front.*

PSYCHIATRY. See PSYCHOLOGY, ABNORMAL: INSANITY.

PSYCHOANALYSIS. See PSYCHOLOGY, ABNORMAL; CONSCIOUSNESS AND THE UNCONSCIOUS: ÆSTHETICS.

PSYCHOLOGY. A historian of contemporary psychology is compelled inevitably to become an interpreter and critic even more than an objective chronicler. With the conflicting aspirations of the various schools, with the different methodologies and points of approach, it is manifestly impossible to do even-handed justice to all claims and to all discoveries. Yet it is possible to attempt with the broad sympathy of a noncombatant to evaluate more or less adequately the more significant contributions of the rival schools. This is the task of the present article.

In the decade after 1914 there were two important challenges to the school of experimental psychology, which had arrogated to itself, not without some justice, the label of scientific psychology. These challenges were made by the doctrine of behaviorism (q.v.) and by the German theory of the *Gestaltpsychologie* (see PERCEPTION). The system of psychology which they challenged is the so-called structural or introspective psychology, developed in Germany by Fechner and Wundt and in the United States by the Cornell school of Professor Titchener. In

a few words, what this school sought to do was to correlate psychological facts as observed introspectively with physical or physiological phenomena as recorded by the best laboratory methods. With the purest intentions in the world, the psychologists of this school did not avoid making metaphysical assumptions, which were confusing both to themselves and to their opponents.

Everybody knows that there is not a one to one correlation between a stimulus as physically defined in terms of social discourse and the impressions it may arouse in a human being's conscious experience. All the arts which employ illusion in one form or another—the pictorial and theatrical arts, to mention but two examples—depend upon this fact. What structural psychology attempted to do was not merely to observe empirical correlations and discordances between these types of phenomena but to transform them into an explanatory system. To do this, the theory of psychophysical parallelism was borrowed from philosophy and adapted with a special signification for psychological problems.

Where the man in the street regarded mental events as causes of physical events and physical events as causes of mental phenomena, the parallelistic doctrine kept the two series radically distinct. As the doctrine was applied in psychology, it meant that for every simple physical event, that is to say for every stimulus, there was a *corresponding* sensation in the mind. At this point the physical series was abandoned and attention directed to the mental series—how from theoretically simple sensations there are built up the complexities of mental life, the perceptions, memories, and logical inferences. The analytic study of these mental processes, with correlation wherever possible to underlying physiological changes, made up what was known as structural psychology.

But the task of applying analytic language to "mental stuff" was never satisfactorily met. The simple sensation could not be isolated in introspection, so that the structuralist school was compelled to build its mental world out of attributes, or dimensions of sensations—quality, duration, intensity, extensity, and clearness.

Now at the beginning of the decade under consideration the doctrine of attributes and sensations had become pretty well shaken. In a doctoral dissertation on "The Relation of Sensation to Other Categories in Contemporary Psychology" (*Psychological Review Monographs*, vol. xvi, no. 67), C. Rahn had pointed out the frailty of the ideological structure, as well as the difficulty of distinguishing between clearness as a sensory attribute and clearness as a quality of a cognitive situation. Partly as a result of this attack, partly through internal development, the Cornell school after 1914 leaned less and less on the concept of sensation. Instead they developed a conception of mental life as a fluid process, with the standard attributes as the dimensional components of this process.

Such a conception tended to obliterate the distinction between sensory experience and the higher mental processes. In fact, C. M. Ogden definitely raised the question (*American Journal of Psychology*, 1922, vol. xxxiii) whether the traditional distinction between sensation and perception should be maintained any longer. The Cornell school hesitated to accept this radical solution, inasmuch as it would have thrown all differentiation of psychological experience into the problem of meaning.

In the meantime, the absorption of this school with the introspective phase of psychological theory could not but disappoint those who were impatiently expecting positive contributions from psychology for the control of human nature. Radical behaviorism, that is to say, the reduction of psychology to externally observable data, furnished one solution. In American psychological periodicals the topic of behaviorism provided most of the heat and a little of the theoretical light on the problem of mental analysis. Behind the clash of schools, there was really a conflict of metaphysical systems, each system being built around a particular technique or method of analyzing phenomena. By themselves, the method of introspection and the method of observing external reactions are not involved in contradiction. But unfortunately it is difficult—and for many persons almost impossible—to separate methodology from metaphysics. Thus very few psychologists were able to distinguish the behavioristic method from the behavioristic metaphysics as championed explicitly by Holt and Perry and implicitly by Watson. And it was also a common charge against introspective psychology that it led to a mentalistic view of the universe, that is to say to a subjective idealism; although if this charge were taken seriously, it would mean that no person could ever resort to introspection without running the risk of becoming philosophically a subjectivist.

As we pass to some of the other "systems" of psychology, we find it again necessary to separate the essential method from the accretion of dogmatism. In Professor McDougall's *Outline of Psychology* (1923), the conception of instincts and dispositions forms the basis of his total psychological structure. However, the urge to system building makes him entitize or hypostatize these instincts, and the result is a crude animistic monadology scarcely different from the ancient eschatologies. (See his presidential address before the British Society for Psychical Research, 1920). Yet instincts are valid conceptions when interpreted in their context, that is to say in connection with the study of human nature from a historical, biological, or moral point of view.

The difficulty lies in the coördination of such concepts, which are qualitatively of a different order from the concepts of physics, with the rather rigid structure of laboratory science. This genuine difficulty, instead of being faced in the same manner as we face differences of language among men, gave rise to a babel of misunderstanding between the mechanistic psychologists and the purposive psychologists.

The tendency to put all notions on the same plane of existence is also illustrated in the *Psychological Principles* of James Ward. The mind is said to exist, together with its powers of feeling, judging and ideating, and the external world is said to exist. But as the notion of existence is based upon physical experience, the mind is thus turned into a suprasensible substance. To be sure, Professor Ward makes his mind a stream of consciousness, but even this does not avoid the paradox of dualism, that is to say of two forms of existence. To appreciate this paradox, it is enough to point out that if we start on the psychological side, with the self, it is impossible to get back to the external

world; and if on the other hand, we begin with the realistic thesis of the external world, we find consciousness a troublesome superfluity. The way the dilemma is commonly avoided is by accepting from the common sense tradition both theses at once, regardless of their contradictory nature when taken in the raw and without interpretation.

The late Theodore Merz in his *Fragment on the Human Mind* invented an expression which is calculated to dispel confusion in this field. He speaks of the "firmament of thought" underlying the phenomenal stream of consciousness that we attain to by introspection The firmament of thought, containing within it that system of spatial relations which we call the external world, is much vaster than the temporal flow of awareness, but yet all our organized knowledge—ultimately resting on the great firmament—passes through the level of consciousness in order to be intellectually organized. If we may resort to an everyday set of metaphors, we may compare the introspective consciousness to the retail stock in trade of an industry. However, in this case we cannot observe the manufacturing end but we may only infer its processes from the table of purchases and sales. When we forget the practical problems of merchandising and just revel in the retailing activity, we do something that corresponds closely to introspection.

If our comparison is legitimate it is clear that the introspective method will never result in a systematization of the introspective consciousness. To the extent that it is systematized, to that extent it loses its character as the psychological stuff of immediacy. This fact is all the more obvious when we deal with the affective phase of conscious life. An intellectual schematism gives only the bare formal outline of the sentiments, not their "matter"; yet we cannot say, as a number of modern psychologists have attempted to say, that emotions are sugar in the blood or adrenalin secretion in the endocrine glands Such questions concerning the nature of the stuff of consciousness or of the stuff of emotions become factitious when we realize that we are plunged in immediate conscious experience and that our natural knowledge is but an effort to hold fast to a few bits of this conscious experience as the guiding norms and framework around which to organize our future and past experience. To quote a remarkable sentence from Goethe, "Sympathy and enjoyment in what we see is in fact the only reality, and from such reality, reality as a natural product follows."

Bibliography. More notable publications of the 10-year period 1914–24 were: G. S. Brett, *History of Psychology* (3 vols. 1912–21); G. Dumas et al., *Traité de Psychologie* (vol. i, 1923); Knight Dunlap, *Outlines of Psychology* (1923); Walter S. Hunter, *General Psychology* (1919); E. B. Holt, *The Freudian Wish* (1915); Wolfgang Köhler, *Die Physischen Gestalten in Ruhe und im Stationen Zustand* (1920); Kurt Koffka, *Beiträge zur Psychologie der Gestalt* (1919); Oswald Külpe, *Vorlesungen über Psychologie* (1920); E. D. Martin, *Psychology* (1924); Theodore Merz, *A Fragment on the Human Mind* (1919); William McDougall, *An Outline of Psychology* (1923); Charles Rahn, *Psychological Review Monographs*, "The Relation of Sensation to Other Categories" (vol. xvi, no. 67); Bertrand Russell, *The Analysis of Mind* (1920); Charles Spearman, *The Nature of "Intelligence" and the Principles of Cognition* (1923); E. B. Titchener, "Act and Function," *American Journal of Psychology*, vols. xxxii, xxxiii; John B. Watson, *Psychology from the Standpoint of a Behaviorist* (1919); James Ward, *Psychological Principles* (1918); H. C. Warren, *Human Psychology* (1919); R. S. Woodworth, *Dynamic Psychology* (1921). See PSYCHOLOGY, EXPERIMENTAL; SOCIAL PSYCHOLOGY, ACTION, ADVERTISING, ÆSTHETICS, ANIMAL PSYCHOLOGY, ASSOCIATION TESTS, ATTENTION, ATTRIBUTE, AUDITION, BEHAVIORISM, CONSCIOUSNESS AND THE UNCONSCIOUS, INSTINCT, MENTAL MEASUREMENT, PERCEPTION.

PSYCHOLOGY, ABNORMAL, AND PSYCHOANALYSIS. If one accepted the standard division of knowledge into theoretical science and applied science, one might suppose that abnormal psychology were the concrete application of the data and laws furnished by general or systematic psychology. In actual fact this supposition is not borne out. So far from borrowing its material from the general psychology of sensations and perceptions, abnormal psychology and its derivative psychoanalysis have furnished a new approach to the problems of mental behavior. The trend of thought known as the "new psychology," even with its exaggerations and unsupported generalizations, may be put down to the credit of psychiatrists who were able to combine clinical knowledge and therapeutic skill with genuine philosophic insight.

Among this class of psychiatrists may be included Charcot and Janet in France, Freud in Austria, Morton Prince and Boris Sidis in America. Different as are their various theories on specific problems, these psychologists are yet at one in their refusal to reduce to the materialistic system of physiology. They affirm the specificity of psychological phenomena and the necessity of an explanation of such phenomena in terms of psychological conceptions rather than in terms of an unknowable structure of the cortex and body nerve tissue. The change in terminology is itself an indication of the revolution in thought: instead of speaking of the science of *neurology*—which is essentially a language pun built up around the popular metaphor of *nervousness*—we now use the terms psychiatry, psychoanalysis, psychological analysis. This is not to say that one attempts to explain phenomena in terms of new psychical or spiritistic entities, but rather in terms of the meanings which particular objective events have for particular individuals in particular circumstances. Just as when we seek to account for the effect the reading of a particular book had on a particular person, we find the objective facts about ink and paper of little importance and must attempt to envisage the subjective meanings aroused by the contents of the book; so psychologists have come to realize that it is of no purpose to study events as mere physical shocks on a physical system without taking into account the emotional contexts, the meanings that are more or less individual to the particular organism.

To describe this type of meanings, many psychologists and physicians have preferred to use the notion of function, and they thus speak of certain psychological troubles as functional neuroses. But whether this term is adopted or not, it has been found that there was only one method for studying the phenomena in question

and that was for the psychiatrist to familiarize himself, by patient questioning and clinical observation, with the inner history of the trouble. This leads us to another observation; namely, that knowledge and theories of this sort—dependent, as they are, very largely upon the artistic insights of the physician and psychiatrist—cannot have the same positivity as the observations of physical science. Freud himself recognized this fact when he wrote (in his *Introduction to Psychoanalysis*) that "it would be an error to suppose that a science is composed only of theses rigorously demonstrated, and it is a mistake to demand this." Janet said much the same thing when he pleaded for psychologists not to consider psychology as a science (in the sense that physicists use the term) but rather as a collection of monographs.

Doubtless because of the frailty of the subject matter, the theories of abnormal psychology, particularly those of psychoanalysis, were subject to grave misunderstandings. On the one hand, the worshippers of clear and precise ideas were scandalized at the fleeting nature of some of the intuitions. But on the other hand many advocates of the psychoanalytic doctrine more than made up for this by bringing rather too much precision into their science. They could do this only by constructing a metaphysics of the sex instinct and its symbolization. In this metaphysics complexes and symbols were treated sometimes as dynamic concepts (i.e. with fluid meaning), sometimes as static concepts on a par with those of the physical sciences. An ambiguity of this type is practically unavoidable, for such notions as symbol and complex carry this ambiguity in their philological meaning. We need only remember that the earliest philosophers to use the notion of symbolism, the Pythagoreans, slipped very naturally into the error of confounding the metaphorical act of symbolization with symbols as static entities representing other objects. Similarly the association psychologists confounded the dynamic act of association or growth of meaning with association viewed externally as a mechanical process, and therefore describable by laws. And inasmuch as the idea of complex is practically identical with association, it is readily seen how psychoanalysts fall into the same ambiguity.

For the purposes of discursive inferential reasoning, it is necessary to treat some of these concepts statically as if they were obeying the laws of mechanical causality. But when that is done, the results must be tested by empirical facts and not by means of the semiæsthetic, symbolic intuitions. Thus it is one thing for a commander of military troops to treat sex as a mechanical, almost material problem, on a par with food supplies and munitions. It is quite another thing for a psychoanalyst, tracing genetically the rise and fall of sentiments in a human individual, to discover what he calls transferences or sublimations of the sex instinct. In the first instance we are treating man as a machine with definite springs which behave in definite fixed ways, and sex is one of those springs. Such a conception is an abstract one, and scarcely fits the facts even in a limited situation. However, it is a precise conception and allows itself either to be verified or denied by empirical facts. In the second case, sex ceases to be a definite thing at all and becomes a sentiment—"an aspiration after happiness," to quote Rémy de Gourmont, "than which nothing is less definite." And the many gropings, the many expressions of the ultimate Libido, are not so much causes of one another as contingent temporal sequences. In order to show a relation of causality in the intellectual or scientific sense, it is necessary to have a limited situation in which an observed sequence, after being purified—so to speak—of its arbitrariness and subjectivity, has been experimentally confirmed.

Now the difficulty of the psychoanalytic technique is that it employs both of these schematisms. The psychoanalyst tries to be both a scientist, dealing not in advice but in observed correlations of fact, and a philosopher-confessor who assists his patient in the pursuit of happiness. Professor Janet in reporting to the French Academy of Medicine on the doctrines of Freud pointed out that psychoanalysis at times lays claim to an entire system of ethics. In a certain sense, it is true, neither the psychiatrist nor the physician escapes that responsibility: the analysis of human nature is too close to the aspirations of human nature to avoid involving the latter. But the scientific and ethical responsibilities must be distinguished and recognized for what they are.

The war cases of shell shock have disproved, in an objective way, the extreme Freudian thesis that sex disturbances (in the more specific sense) are the cause of neuroses. They revealed a rather new type of neurosis with preoccupations very different from those of civilian cases and reflecting quite definitely the war anxieties. They also served to disprove the mechanistic, physiological conception of the so-called functional nerve diseases.

With the destruction of the extreme Freudian thesis and the dogmatic physiological contention, no specific theory of neuroses has been left standing. In France—where psychological thought has never accepted either of these theses—an attempt was made by a brilliant writer, Dr. Albert Deschamps, to exploit the theory of fatigue as the raison d'être of the general type of neurasthenic diseases. Both the theory and the cure which it proposed harked back to the famous rest treatment of Weir Mitchell, which was very popular among psychiatrists a generation ago; but like so many other theories in abnormal psychology, the conception of fatigue and insufficiency of nervous energy was seen to be a valuable partial truth which permits the observer to understand the concrete nature of a particular class of cases but which is misleading when generalized into what amounts to a metaphysical conception.

The question may well be asked why such partial truths do not sooner or later find their place in a systematic classification, such as obtains in the natural sciences; why, for instance, there is not as complete a table of mental diseases with more or less empirical specifics as is the case in physiological therapeutics. The answer is to be found in the entire absence of a spatial form of representation, a circumstance which makes every mental concept, every mental theory, an elusive metaphor. In the domain of mind we come in contact with truths in a manner not very different from scents and odors. That is why the science of mind, necessarily different from the science of matter, comes in the long run to have no other criterion than the cultivated taste of the connoisseur.

We come back to the point we made at the beginning of this article. The real significance

of abnormal psychology as a theoretical study is for the light it sheds on the nature of normal psychological facts. An analogy comes to mind from social experience. Just as the political rebel, by challenging the ideology of an existing order, often makes the rest of the people realize the narrowness of the folkways, so the psychologically maladapted bring to light the limited horizons of ordinary mental behavior and even of the sciences of such behavior.

Bibliography. Charles Blondel, *La Conscience Morbide* (1914); J. W. Bridges, *Outline of Abnormal Psychology* (1919); I. H. Coriat, *Repressed Emotions* (1920); Albert Deschamps, *Les Maladies de l'Esprit* (1919); Georges Dumas, *Troubles Mentaux et Troubles Nerveux de Guerre* (1920); Sigmund Freud, *Introduction to Psychoanalysis* (1921), *Group Psychology and the Analysis of the Ego* (1922); H. L. Hollingworth, *Psychology of Functional Neuroses* (1920); J. H. van der Hoop, *Character and the Unconscious* (1923); Pierre Janet, *Les Médications Psychologiques* (3 vols., 1919), *La Médicine Psychologique* (1923); Ernest Jones, *Papers on Psychoanalysis* (1919), *The Treatment of Neuroses* (1920); C. J. Jung, *Studies in Word Association* (1919), *Collected Papers on Analytical Psychology* (1923); Hugh Crichton Miller (editor), *Functional Nerve Disease, an Epitome of War Experience for the Practitioner* (1920); A. Wohlgemuth, *A Critical Examination of Psychoanalysis* (1923). Consult also the files of the *Journal of Abnormal Psychology*, *The International Journal of Psychoanalysis*, *Journal de Psychologie Normale et Pathologique*, etc.

PSYCHOLOGY, EXPERIMENTAL. The progress of systematic experimental psychology during the decade 1914–24 was, as previously, largely confined to the tabulation and classification of sensations. A number of attempts were made to carry on the study of feeling and affection along experimental lines, but the results discovered remained isolated and were not integrated with the general body of natural knowledge. After the failure of Wundt's tridimensional theory of feeling, nobody attempted to construct a comprehensive empirical theory. The study of affective states was thus by force relegated to the theoreticians of psychoanalysis and abnormal psychology, who because they approached their subject less rigorously often got more concrete results. On the other hand the experimental study of perception—a much more feasible programme—was for a long time held up and thwarted on account of the systematic assumptions held by many psychologists. These assumptions were not challenged in the experimental realm until the rise of the configurational or *Gestalt* school of psychology in Germany. The dispute over the assumptions of the structural experimentalists and the German configurationists was still an open question in 1924; for that reason we are treating the subject of perception (q.v.) in a separate article

Vision. In the field of vision, Prof. L. T. Troland brought together, in a monograph published by the National Research Council (*Bull.*, vol. 5, no. 27, December, 1922), the available experimental data on the "Present Status of Visual Science." Passing lightly over the theories of color vision, he concentrated his attention on the psychophysics of vision. He reduced the introspective attributes of color to brilliance, saturation, and hue, the latter two being included in the term "chroma." Each of these attributes can be correlated with the wave length, intensity, and purity of the light stimulus. Troland also made a similar analysis of the perception of forms and of things in motion, first separating the introspective conditions from the physical and then proceeding to work out psychophysical relationships between them.

These relationships or functions he sought to divide up among the several stages of visual response. For instance, he assigned such effects as scotopic and photopic adaptation to the receptors, while other effects such as Carpentier's bands he attributed to the afferent conduction, with still others, like motion perception, belonging to the cortex. These relationships hold between the stimulus and the visual consciousness, but in some instances, according to Troland, "we are actually able to establish empirically the relationships between visual consciousness and stages in the response other than the stimulus." He went on to say that "this is particularly true with respect to the central process itself. The disturbances of vision which accompany lesions in the occipital lobe of the cerebrum demonstrate clearly the fact that the totality of the visual consciousness depends phychophysically upon the brain process; so that relations such as those studied in the majority of laboratory experiments, between consciousness and the stimulus, must be explained in terms of the physiological mechanism of the response, leading up to the focal region in the cortex, as well as by the direct psychophysical relation which exists between consciousness and the cortical activity in question."

Professor Troland's monograph contains a detailed bibliography of 268 titles, to which we refer the interested reader.

Audition. Professor Troland's systematization of visual science is paralleled by a treatise by Prof. R. M. Ogden on *Hearing* (1924). The volume treats every phase of the subject, from the controverted question of tonal attributes to the psychology of musical ability. *The Psychology of Sound* (1917), by Henry J. Watt, is another systematic treatise. As is usual with systematic treatises, the empirical facts are imbedded within a methodological viewpoint. In the case of Watt, he contributes the attribute of order, and it is upon this basis that he organizes a whole system of auditory space and volume. This attribute was objected to by other experimentalists

G. J. Rich, in a study of tonal attributes (*American Journal of Psychology*, vol. xxx) concluded, on the basis of numerical limens and the reports of his observers, that only three such attributes exist. These are pitch-brightness, volume, and tonality. Vocality he found to be a perceptive sign and not an attribute as maintained by Schole, Koehler, and others. Rich's concept of tonality resembled Kohler's *Tonhöhe* more than Revesz's *Qualität*.

Sir Thomas Wrightson, in his *Inquiry into the Analytical Mechanism of the Inner Ear* (1918), attacked the classic Helmholtz theory of hearing and proposed one of his own. He availed himself of the histological researches of Keith to propose a mechanical pressure-balance theory of hearing, in place of the German's conception of nerve fibres as resonators. Profs. E. B. Titchener and E. G. Boring (*American Journal of Psychology*, 1920, vol. xxxi) then proceeded to demolish the Wrightson theory, and showed that

while Helmholtz's theory was not sufficient to cover all the known facts, neither was any other theory proposed thus far.

Taste and Smell. The outstanding contribution of the decade was the revision of the classification of taste and smell qualities by H. Henning (*Zeitschrift für Psychologie*, vols. lxxiii, lxxiv). Experimental psychology had been content, in general, to accept Zwaardemaker's improvement on the old Linnæan classification of odorous qualities, and of the same investigator's results in the matter of olfactory mixtures and compensations. Henning, after trial of over 400 stimuli, proposed a new classification. There are, according to him, six fundamental qualities: fruity (lemon), putrid (H_2S), flowery (violet), resinous (frankincense), scorched (tar), and spicy (nutmeg). [The examples in parentheses are typical only.] The whole body of olfactory qualities, fundamental and intermediate, may be arranged on the surface of a triangular prism. At the six angles stand the pure fundamental odors, and along the edges, diagonals, and other cross lines of the surface lie the qualities which "resemble" two or more of the fundamental qualities. These intermediate qualities are all psychologically simple; their relation to the fundamentals is analogous to that of a tone to the limiting tones of the octave within which it is placed.

The basis of classification was introspective, although Henning undertook a correlation with chemical structure; likeness of intermolecular combination appeared to parallel likeness of olfactory quality. In the matter of mixture, Henning denied outright the analogy of odor and color; the olfactory experiences which result from dual stimulation, in his opinion, resemble rather the tonal fusions, for like the latter they evince degrees of fusion ranging from the "combinational odor" to less unitary forms. In general, any olfactory quality may fuse with any other; but the nature of the fusion depends upon the nearness or remoteness of its components in the olfactory series.

The treatment of taste on the part of Henning was no less radical. The German psychologist recognized the four fundamental qualities of sweet, sour, bitter, and salt, but insisted that they are connected by series of simple intermediate qualities, whose relation to the pure qualities is akin to that of the intermediate colors to the pure red, yellow, green, and blue of the color square. The whole system of taste qualities may be arranged on the boundary lines of a tetrahedron, with the pure fundamentals at the four angles. The mixture of gustatory stimuli gives fusions which in every case are readily analyzable.

Cutaneous Sensation. Head's theory of protopathic and epicritic sensibility was attacked from two quarters. H. Carr (*Psychological Review*, vol. xxiii) criticized the theory on grounds both of logic and of observation. E. G. Boring, repeating Head's experiment under improved conditions, reported his own observations of the return of cutaneous sensitivity after section of a sensory nerve (*Quarterly Journal of Experimental Psychology*, vol. x). He found that the results which Head's technique threw into high relief lost their special importance in the light of a more refined method, and that they took their place in a total body of fact which shows no such line of cleavage as that described by the British physiologist.

Boring himself outlined a theory of multiple innervation of the sensory "spots"; the nerve supply, he held, is so distributed that, under varying conditions, summation or inhibition of excitations may occur in varying degree. A hypothesis of this sort is, in Boring's opinion, adequate to the data of observation, and avoids the duplication of sensibilities which Head was led to assume.

Organic Sensations. E. G. Boring (*American Journal of Psychology*, vol. xxvi) reported experiments on the sensations aroused by the stimulation of the alimentary tract. He used thermal, mechanical, chemical, and electrical stimulation. In the esophagus, sensations corresponding to all stimuli except pepper and mustard were reported; in the stomach all were sensed, but it was not certain whether the sensations of cold, warmth, and electrical shock arose in the stomach or in the surrounding tissues. Hydrochloric acid was found to induce the sensation of hunger. The greatest error of localization occurred in the direction of the median line through throat and stomach, reference being often made to head, to throat, or to a point below the sternum.

Boring also made a qualitative study of experiences referred to the alimentary and urinary tracts (*Psychological Review*, vol. xxii). He concluded that under favorable conditions most of the experiences are introspectively reducible to various patterns of pressure and pain. Nausea was the most difficult experience to analyze. Experiments reported by A. J. Carlson (*The Control of Hunger in Health and Disease*, 1916) confirmed many of Boring's observations. Carlson, however, maintained that hunger is experimentally distinguishable from appetite; appetite, he held, may appear in the absence of hunger, and can be aroused by weak chemical stimuli which inhibit the hunger contractions.

PSYCHOLOGY, SOCIAL. See SOCIAL PSYCHOLOGY.

PUEBLO INDIAN LANDS. See INDIANS.

PULP, WOOD. See PAPER AND WOOD PULP.

PURDUE UNIVERSITY. A technological State institution founded in 1869 at Lafayette, Ind. The number of students rose from 2341 in 1914 to 3235 in 1924, the number of the faculty from 185 to 323 and the library increased from 40,000 to 60,000 volumes. The tax appropriations for the support of the university were correspondingly increased during the period from $479,251 to $1,415,000. A department of forestry was established, and the total number of courses offered in all departments was increased from 421 to 579. Advanced military training was introduced into the junior and senior years of all schools. Buildings costing more than $800,000 were built during the 10 years. These included the armory, costing $194,356, built in 1918; the home economics building built in 1923 at a cost of $151,414; Stanley Coulter Hall, for the biology department, built in 1917 at a cost of $101,440; a recitation building for the departments of education, history and economics and mathematics; a veterinary building; a horticultural greenhouse; a campus greenhouse; a locomotive museum; and buildings for the farm of the School of Agriculture. Winthrop Ellsworth Stone was succeeded as president by Edward C. Elliott.

PUTNAM, NINA WILCOX (MRS. ROBERT J. SANDERSON) (1888–). An American author, born in New Haven, Conn., and educated

privately. She began writing at the age of 11. Her books include *Esmeralda* (1918); *It Pays to Smile* (1920); *West Broadway* (1921); *Laughter Ltd.* (1922); *Say It with Bricks* (1923); and *Easy* (1924). She was a frequent contributor of short stories to the leading magazines.

PYRITE. See SULPHUR.

PYROTECHNICS. See ORDNANCE; TRENCH WARFARE MATERIAL.

Q

Q-SHIPS. See VESSELS, NAVAL.

QUANTUM THEORY. See CHEMISTRY, ORGANIC.

QUARRIES, UNITED STATES. See STONE.

QUATAR, EL. See ARABIA.

QUEBEC. A Canadian Province with an area of 706,834 square miles, and a population of 2,361,199 in 1921, a gain of 17.7 per cent over the 2,005,776 of 1911. The rural population continued to fall off, in 1921 only 44 per cent of the total population living in rural districts as compared with 51.8 per cent in 1911. In 1921, males numbered 1,180,028 and females 1,181,171. By the 1911 census, 316,103 of the inhabitants were of British and 1,605,339 of French descent. There were 442,356 families in 1921 as compared with 307,304 in 1901. Populations of the largest cities in 1921 were: Montreal, 618,506 (490,504 in 1911); Quebec, the capital, 95,193 (78,710 in 1911); Hull, 24,117 (18,222 in 1911); Verdun, 25,001; Sherbrooke, 23,515; Three Rivers, 22,367.

Industry. Agriculture continued to thrive, averaging a total value of field crops of about $200,000,000. Low prices in 1923 accounted for the falling off in that year, the total being $133,137,400 ($99,279,000 in 1914). Hay and clover, oats, potatoes, buckwheat, barley, spring wheat continued to lead. Potatoes and turnips in particular showed increases. Fruit culture flourished, as did the maple sugar and syrup industry which averaged about $6,000,000 annually (1922, $4,187,630, as compared with $1,600,000 in 1913). In 1920, 33,000 acres were under tobacco, but the tillage fell off to 16,573 acres in 1922. The live-stock industry continued to expand, milch cows increasing from 761,816 to 968,705; other cattle from 693,540 to 813,046; sheep from 602,751 to 822,997; swine from 661,768 to 797,726. The wool clip in 1923 was 4,682,602 pounds and was second only to that of Ontario. Dairying, always an important industry, brought in $61,188,000 in 1923 in cheese, butter, and other products. Lumbering produced $19,656,462 worth of cuts of lumber in 1921. The manufacture of pulp and paper products led the Dominion. In 1922, $43,329,740 worth of wood was used in the manufacture of pulpwood while paper products totaled $108,676,952. In 1921 the fish catch had brought in $2,592,382; in 1921, $1,815,284; in 1913, $1,988,241. The mineral yields had only barely tapped the vast resources of the Province. In 1922, the total mineral production was $17,647,939, as compared with $11,836,929 in 1914. Asbestos ($5,552,723 in 1922), cement ($5,907,300), and limestone continued to lead. Discoveries of gold in northwestern Quebec drew prospectors to Malmartic and Fournière townships so that 3000 acres in claims had been staked out by 1922. The industrial development of the Province was marked, the census of 1921 showing 10,762 establishments, with a capital investment of $973,722,564 ($378,441,000 in 1913), and $784,753,805 the value of products produced ($406,167,950 in 1913). The number of employers was 10,762 and salaries and wages paid, $164,450,443. The distribution in 1921 of the value of manufactured products was. Montreal, $593,881,752; Quebec, $45,121,279; Hull, $16,623,648. The leading industries in order were: pulp and paper, wood, lath, etc., cottons, flour-mill products, leather, shoes, tobacco, butter and cheese, meat packing, clothing, shipbuilding, housebuilding, rolling mills. In every case the product was more than $20,000,000. The estimated water power of the Province totaled probably 6,915,244 horse power of which 1,073,883 horse power had already been developed, all by private capital. Work was under way on plants on the Montreal River and Lake St. John in 1923.

Trade and Communications. In 1922 there were 4977 miles of railway as compared with 4043 miles in 1914. Total imports for consumption in 1922–23 amounted to $222,478,422 ($187,301,493 in 1912–13); exports to $315,480,911 ($147,723,907 in 1912–13)

Government. Revenues for 1913–14 were $9,000,377; expenditures $8,624,368; by 1921–22 these had reached revenues of $21,609,396 and expenditures of $16,575,977. While the Dominion subsidy had remained the same over the period, larger revenues were derived from the succession and commercial corporation taxes. In June, 1922, the funded debt was $55,604,926 ($24,579,166 in 1914). For 1921, there were 5686 Roman Catholic elementary schools with 227,986 enrolled pupils; 697 model schools with 108,125 pupils; 378 academies with 110,202 pupils; 13 normal schools with 1215 pupils; in all (including all others), there were 6934 schools with 477,944 pupils. Besides, there were 799 Protestant schools of all grades with 70,307 pupils enrolled The total expenditure for all education in 1920–21 was $22,122,979 as compared with $9,225,771 in 1913. In the Dominion parliament representation remained the same; House of Commons, 65, Senate, 24. Of all the Canadian Provinces, Quebec remained the only one in which women were not enfranchised or permitted to stand for the Legislature of the Province.

QUEENSLAND. A state of the Commonwealth of Australia occupying the northeastern part of the continent. Area, 670,500 square miles; population, in 1911, 605,813; in 1922, 785,449; average annual increase, 2.52 per cent. Brisbane, the capital, including suburbs, had 209,699 inhabitants in 1921. Of the total area of the state, 94 per cent still remained unpreempted. Leading agricultural activities centred in the planting of maize, wheat, hay, and sugar cane. Pastoral pursuits continued to be important. The wool output in 1921 was 132,579,733 pounds (136,878,270 pounds in 1912–13). Sugar in particular showed increases,

the yield in 1921 being 2,287,400 tons of cane as against 1,135,126 tons in 1912–13. Total value of minerals in 1912, £4,175,355; in 1920, £3,462,214; in 1921, £1,456,436. Gold continued to decline, dropping from £1,128,868 in 1913 to £171,504 in 1921. Coal was the only mineral to show important gains in the decade. Imports for 1916–17 and 1921–22 were £6,263,102 and £8,639,446; exports for the same years were £14,542,270 and £17,573,103 Government accounts showed: revenues and expenditures for 1913, £6,378,213 and £6,372,097; the same for 1921–22 were £12,311,378 and £12,499,970. The debt mounted from £55,023,506 in 1914 to £88,005,001 in 1923 Here, as in New South Wales, the Labor party continued the most powerful group. In 1922, as a result of continuous agitation, a referendum decided for the abolition of the legislative council

QUICKSILVER PRODUCED IN THE UNITED STATES IN 1923

State	Mines producing	Ore treated	Quicksilver obtained: Percentage tenor won [a]	Quicksilver obtained: Flasks of 75 pounds	Value
California	9	(short tons)			
Texas, Nevada, Oregon, and Idaho	5	38,648	0.52	[b] 5,417	$357,759
	—	12,148	0 82	[c] 2,490	163,543
Total for 1923	14	50,796	0.59	7,937	521,302
Total for 1922	10	43,084	0.51	6,375	368,348

[a] Weighted means for 1923
[b] Includes 31 flasks obtained from cleanups, etc., and not considered in calculating percentage tenor
[c] Includes 179 flasks obtained from an unknown quantity of ore and not considered in calculating percentage tenor.

QUICKSILVER. The production of quicksilver was somewhat stimulated by the War, and in 1918 the world's output amounted to 3421.5 metric tons, but in 1921 it had declined to 2019 metric tons. In the latter year, Italy was the largest producer, its output amounting to 1071 metric tons, followed by Spain with 6354 metric tons, and the United States with 215.6 metric tons In the year 1922, the production of the United States increased slightly, being represented by a total of 6375 flasks of 75 pounds each, valued at $368,348 This was very little in advance of the 1921 production, 6339 flasks, the lowest annual output in the 72 years of recorded production of domestic quicksilver in the United States In this year a new duty of 25 cents a pound ($18.75 a flask) was a source of encouragement to the American quicksilver industry but with it came increasing difficulty in finding new ore and in securing competent labor

As will appear from the table, California produced 69 per cent of the 7937 flasks of quicksilver credited to the United States in 1923, and most of the remainder was produced in Texas. The increase in the output of the country over that in 1922 was the result of the resumption of production at the New Idria in California. Without this contribution the production in 1923 would have been lower than in 1922. During 1923, the United States exported 318 flasks of quicksilver and imported 18,073 flasks. There was an increase of nearly 14 per cent in the average price at San Francisco over the previous years and an increase of nearly 25 per cent in the production. The price of the metal declined from $70.70 in the first week of 1923 to $59.35 in the last week, and the average for the year was $65.68. Early in 1924 the price improved notably, and could it be maintained near or over $70 a flask, there would be increased production. Interest among producers of quicksilver was directed to the new mercury boilers designed by W L R Emmet. If this should prove as successful in practice as its sponsors believed, it would unquestionably produce an increased demand for quicksilver. Should this demand eventually develop, a large part of the quicksilver to satisfy it would have to be sought in foreign countries, for the deposits in the United States do not appear to be adequate to supply it. See BOILERS.

QUINIDIN. See HEART DISEASE.

QUINN, EDMUND T. (1868–). An American painter and sculptor born in Philadelphia. He was a pupil of the Pennsylvania Academy of Fine Arts and of Thomas Eakins, and in Paris of Injalbert He is an Associate of the National Academy and a member of the National Institute of Arts and Letters and is represented in America by a statue of Zoroaster, at the Brooklyn Institute of Arts and Sciences; a bust of Edgar Allan Poe in Poe Park, New York; a statue of Edwin Booth in the character of Hamlet at Gramercy Park, New York, and the World War Memorial at New Rochelle, N. Y. He has executed many portrait busts of prominent American men, and is a member of the council of the National Society of Sculptors.

R

RABAUD, HENRI (1873–). A French conductor and composer, born in Paris. He was trained under Massenet at the Paris Conservatoire and in 1894 won the Prix de Rome with a cantata, *Daphné*. In 1908–14 he was conductor at the Opéra Comique and in 1914–18 at the Grand Opéra. In 1915 he was also appointed conductor of the famous Concerts du Conservatoire. During the season of 1918–19 he conducted the Boston Symphony Orchestra and in 1920 succeeded Fauré as director of the Paris Conservatoire. His works comprise the operas, *La Fille de Roland* (Paris, 1904), *Le Premier Glaive* (Béziers, 1908), *Mârouf*, and *Savetier du Caire* (Paris, 1914; New York, 1917); two symphonies; a symphonic poem, *La Procession Nocturne; Divertissement sur des Chansons Russes; Eclogue;* an oratorio, *Job;* a Psalm for soli, chorus and orchestra; incidental music to *The Merchant of Venice, Antony and Cleopatra,* and St. Pierre's *Paul et Virginie; Hymne à la France Eternelle;* a string quartet, and other chamber music.

RABIES. See VETERINARY MEDICINE.

RACE BIOLOGY. See EUGENICS.

RACE PROBLEMS, UNITED STATES. The United States has faced internal race problems from the beginning. First, there were the Indian tribes to be displaced, controlled, and assimilated. In the main, this was a problem of conquest and subjection, and though once a serious matter, it has long ceased to trouble any one, except as a moral obligation of the nation to deal justly with the few Indians that survive (see INDIANS). Next in order came the Negro problem, resulting in the Civil War, through which the Negro came into the right to citizenship, but this raised anew social and political problems that are still acute Finally, the open door policy upon which the Government of the United States was founded as an asylum for the oppressed and dissatisfied of every color, creed, and nationality brought so many diverse racial elements to its shores that public sentiment began to demand restrictive measures, which ultimately culminated in an exclusion policy (see IMMIGRATION). Both the Negro and the immigration question are very complex, but one of the factors always recognized is that of race, or the biological problem. The apparent rapid increase of mulattoes, for example, threatens to end in complete hybridization of both white and Negro stocks. Naturally, this raises the question as to the desirability of such amalgamation and the quality of the resulting hybrids. Again, in the early decades of the nation's history, immigration was chiefly from the countries of northern Europe where the people were very much alike; but later, Asiatic peoples threatened to fill up the western States, and still later, the populations of southern Europe began to migrate to the Atlantic States in large numbers. As to Asiatics, the race question was promptly raised and a policy of exclusion adopted. Finally, the growing volume of immigration from eastern and southern Europe raised questions of policy leading to an Act of Congress in 1907 creating an Immigration Commission.

While the chief factors considered by this commission were economic, they did provide for a study of the racial elements in immigration. This research was directed by Prof. Franz Boas of Columbia University, and the results were published in 1910. The immediate objective of the inquiry was to discover what biological changes, if any, took place in the successive descendants of foreign stocks. The stocks selected for study were Bohemians, Slovaks, Poles, Hungarians, Jews, Sicilians, and Neapolitans, and the results, it was claimed, showed that certain marked changes were going on in head form, facial dimensions, and stature. In other words, the new environment in which the children of immigrants grew up seemed to have brought about definite modifications in facial characters. These changes were minute, but they were heralded as proving that racial types were not stable and that the new environment of America tended to level down differences. The investigation was too limited in scope to warrant such a sweeping conclusion, and it was not followed up. Its chief value, then, is in pointing out the scientific approach to the biological problems in immigration. The publication of this study provoked a great deal of discussion, and it was closely followed by several forceful statements of the racial problems involved in the immigration question; e.g. Madison Grant's book, *The Passing of the Great Race.* Mr. Grant's thesis was that the peoples of northern Europe, grouped under the name Nordic, are responsible for the modern civilization of western Europe and America, that their peculiar racial abilities are the basic causes in the evolution of this type of civilization, and that with the development of this civilization come abundant contacts with other racial stocks, resulting in mixture of blood and the gradual disappearance of the old Nordic stock.

The War put the supreme test to the naturalized citizen and his children. The situation so created awakened a sense of insecurity in the face of large blocks of ill-assimilated aliens and shocked the country into a sober contemplation of the political and social dangers involved. Further, the universal draft brought into the army, the navy, and other branches of the service, representatives of all the racial groups in the country, so that they were thrown into competition with each other. For some years previous to the War, the special students of psychology and education had been actively developing methods of rating the abilities of individuals. Naturally these methods were used in the classification of the army personnel, and it was inevitable that in comparing the ratings given, account should be taken of racial differences. These were fully set forth in a bulky

report on *Psychological Examining in the United States Army*, edited by Robert M. Yerkes. Later, the racial differences in soldiers' ratings were critically presented by Carl C. Brigham in *A Study of American Intelligence*. Marked differences in rating were found for the several racial elements in the army. The question of relative racial merits was thus raised, and also the danger of lowering the national intelligence average by unrestricted immigration from stocks with a low rating was apprehended The publication of the army test results provoked heated discussion, and this in turn stimulated research by psychologists and educators. Careful studies were started in the schools of the country, where the results could be fully checked. Fundamental inquiries were also being made as to the objective criteria of superior ability, which would in the end give more precise methods for distinguishing between the native ability of the individual and what he has acquired by education.

From the army tests it was observed that the relative average ratings for men of English, Dutch, Scotch, German, and Danish descent was above the United States national average for the native-born white. The full series in order from the highest to the lowest in rating was as follows: England, Holland, Scotland, Germany, Denmark, native-born white, Canada, Sweden, army average for all white soldiers, Norway, Belgium, Ireland, Austria, Turkey, Greece, foreign-born white, Russia, Italy, Poland, and Negroes. This rating indicated that the immigrants from countries in northern Europe were better qualified to perform the duties of soldiers than were those from southern Europe. In these results an attempt was made to eliminate the learning and language factor, as by comparing the ratings for those of little schooling with those from the same racial stock with more than the average school experience, etc. The critics of these studies have, however, emphasized the specific character of the army tests and raised the more general question as to whether abilities shown in them are desirable in times of peace. On the other hand, the psychologists have been able to make a good case in their claim that to a large degree native ability is measured, but they are now actively engaged in further researches on this problem.

Of the studies completed in the United States since the War, mention may be made of those of Indian children by Professor Hunter of the University of Kansas, which show not only that Indians rank below white children, but that the mixed-blood children take intermediate positions according to the degree of mixture. In a similar way, by the use of psychological tests, Sullivan and Paschal of the University of Arizona have shown that among so-called Mexican children in the public schools of the border States the rating increases with the lightness of skin color. These are, however, but samples of the great volume of data which in 1924 was being accumulated in the educational institutions of the country, where the use of psychological and educational tests had become all but universal. Since all the racial elements in the population are represented in the schools, educators and psychologists were expected soon to have in their hands a basis for estimating the relative qualities of mental ability in each. On the psychological side of the race problem, 1914–24 has been a decade of progress, probably the forerunner of a great advance in knowledge and consequently of the formulation of new national policies.

The race problem has other such aspects as psychopathic tendencies, immunities to disease, longevity, fecundity, etc., as well as all forms of social delinquency Modern conditions doom the able and competent to support the sick, the inefficient, the criminal and defective; hence, it is inevitable that stock should be taken of the different racial immigrant groups with respect to these characteristics. Insurance companies had begun to segregate their vital statistics according to race, and this reveals positive differences in the expectation of life. An investigation by Dublin showed a higher rate of mortality for the foreign-born of New York as a whole and higher than for the same stocks at home. When the races are treated separately, however, the Russian Jews equal the native-born; the descending order is Russian Jews, Italians, English, Scotch, Welsh, Germans, and Irish. These varying death rates are probably indicative of different degrees of resistance to the strain of readjustment to American life, and so are an index of racial values in immigrants.

Further, the United States Congress authorized an inquiry as to the relative number of defectives in public institutions, a report on which was made by Dr. H. H. Laughlin. According to this report, a much greater proportion of the foreign-born are found in public institutions for feeble-mindedness, insanity, epilepsy, blindness, deafness, etc., than of the native-born, and again the ratio for immigrants from southern Europe is much higher than for those of northern Europe. While this is a pioneer study and the results cannot be taken as final, yet like all the preceding investigations, it makes clear the force of the race factor, and the need of extensive research for guidance in the development of a sound policy with respect to immigration and internal affairs.

Further, the need of anthropometric studies among the population of the nation, region by region, has become apparent. Not only did the publication of measurement data by the Surgeon-General of the United States Army reveal the importance of such studies, but the manufacturers of ready-made clothing, engaged in quantity production, are finding it increasingly difficult to gauge accurately the proportionate number of suits for each standard size. A faulty estimate in this will entail losses of great magnitude. Clothing manufacturers are in the same predicament as a life insurance company would be without vital statistics, for without adequate data on the regional differences in bodily size and proportion, they can only proceed blindly. And the uncertain element is race, since immigration has been changing the population content from decade to decade and hybridization has been introducing new ratios of bodily proportions. It is, therefore, becoming clearer that a study of bodily size and vigor on a national scale is needed for economic as well as for social reasons

Even during the late War the United States military authorities experienced great difficulties in supplying in advance the proper sizes of clothing for the enlisted men. Accordingly, a series of measurements were made at demobilization for the establishment of sizes and frequencies. In these measurements the ancestry

of soldiers was taken, thus giving some comparative data as to race, from which it appears that significant differences in size and proportion hold for the several race groups. As a sample of these differences in size and proportion the following ranks may be noted:

Stature	Weight	Chest Circumference	Waist Circumference
Scotch	German	Polish	German
English	Polish	German	Polish
German	English	Italian	Irish
Irish	Scotch	Irish	Scotch
Polish	Irish	Scotch	French
French	French	French	Italian
Hebrew	Italian	English	Hebrew
Italian	Hebrew	Hebrew	English

The greatest average measurement is at the top of each column; thus, while the Scotch and English are tallest, they are quite far down the line in waist circumference, especially the English. Likewise the measurements for the native-born show that the mountaineers of Carolina, Kentucky, and Missouri, who are largely of Scotch and English stock, are very tall, but slender in body. The Poles, Italians, etc. making up the bulk of recent immigration are relatively large in chest. It is clear that the physique of the nation is undergoing regional changes and that its bodily future presents military as well as industrial problems. However, the study of populations is now generally recognized as a special field for research, upon which a volume has been issued by A. Carr-Saunders, entitled *The Population Problem*. In general, however, it is clear that race problems in the United States are little short of world problems and that under modern conditions they are the most fundamental of population problems See ANTHROPOLOGY; ETHNOGRAPHY; MENTAL MEASUREMENT.

RACES, ORIGIN OF. See ANTHROPOLOGY.

RACES OF MAN. See ANTHROPOLOGY.

RACIAL MINORITIES TREATIES. The protection of racial, linguistic, and religious minorities constituted one of the most difficult problems dealt with at the Peace Conference of Paris. Throughout the world there was a tremendous agitation for national self-determination. The peace-makers of 1919–20 endeavored to enshrine the principle of nationality in the political and territorial resettlement of Europe, and to a large extent they succeeded (see PEACE CONFERENCE AND TREATIES); but so intermingled were different nationalities in various parts of the former empires of Russia, Austria-Hungary, and Turkey that it proved virtually impossible to draw frontiers for Poland, Czecho-Slovakia, Rumania, Serbia, Greece, etc., which would satisfy the legitimate ambitions of their own peoples and yet not outrage their neighbors. Ethnographic considerations had to be weighed, along with economic and strategic necessities and desires. A racio-religious problem like that of the Jews who were suffering persecution even during 1919 in various countries of Europe, particularly Poland, served to complicate the situation. The Jews were indeed promised a national homeland in Palestine, but even there they were in a minority. Meanwhile, what was to become of their kinsmen in Europe? These problems could not be solved by splitting up the world indefinitely. Not every tiny group could have its own flag and place in the family of nations. The formula of self-determination, carried to an extreme, would have been a reductio ad absurdum. On the other hand the world had been so long and so sorely troubled by such repressive movements as the Anglicization of Ireland, the Russification of Poland, Finland, etc., that it would have been utter folly to hand over dissentient minorities to the tender mercies of nationalist patriots who despite their own thirst for national political independence and national cultural expression would tyrannize over "inferior races." Experience had amply demonstrated that newly emancipated or unified nations were the first to deny emancipation or unification to others.

The Great Powers which dominated the Peace Conference did not intend to have their sovereignty impaired by pledges regarding the equitable treatment of minorities within their own boundaries, but neither were they entirely willing to underwrite a settlement affecting other states in which the oppression of submerged nationalities should constitute too great a menace. They argued that as it was their efforts that had largely won the War, it was their duty and privilege to dictate the peace, and as they were consenting to the resurrection or augmentation of Poland, Rumania, Czecho-Slovakia, Jugo-Slavia, etc., and were transferring large numbers of people of different races, languages, and religions from those of the majority, they had the right and were in duty bound to see that states which they were so conspicuously aiding should not be in a position by unjust or tyrannical treatment of such minorities to imperil the peace of the world. During the stormy eighth plenary session on May 31, 1919, President Wilson took the lead in defending the attitude of the Great Powers, much to the dismay and discontent of the smaller powers. Rumania and Jugo-Slavia hotly resisted the exaction of such pledges as were contemplated and even refused for several months to sign the Treaty of St Germain, but eventually (December, 1919) they were partly coerced, partly conciliated, into signing. (See PEACE CONFERENCE AND TREATIES.) During 1919 and 1920 the Great Powers negotiated a series of treaties with the Balkan powers and succession states which elicited pledges to respect and preserve political, religious, cultural, and economic rights of dissentient groups.

In the case of Poland (treaty signed June 28, 1919), special protection was deemed necessary for the Jews, who constituted one-seventh of the population. The new Poland came to include also some 2,000,000 Germans and 3,000,000 Ruthenians, in the province of Galicia, who were to be similarly protected. In the case of Czecho-Slovakia, there were some 3,000,000 Germans, 750,000 Magyars, and 460,000 Ruthenians, not to mention the religious minorities comprising some 1,000,000 Protestants, 500,000 Greek Catholics, and 350,000 Jews. In the case of Rumania there were several million Magyars, Germans, Serbs, etc., and a large element of Jews (750,000). In Jugo-Slavia special provisions were made for the Moslems. In addition there were incorporated in this new state some 450,000 Germans, 450,000 Magyars, 150,000 Rumanians, and some Bulgarians. Italy, which acquired not only the Italian-speaking population of irredentist Trentino and Trieste but also some 300,000 Austro-Germans in the Tirol and a like number of Jugo-Slavs near the Adriatic, was not obliged to make any

pledges. Greece, however, being a small power, was forced to promise special treatment for minorities in Macedonia, Thrace, etc. Clauses protecting minorities were inserted in the treaties with Austria, Bulgaria, Hungary, and Turkey; and subsequently Germany, as a result of the Upper Silesian settlement, was compelled to subscribe to the principal parts of the Polish Minorities Treaty for at least 15 years as regards those parts of Upper Silesia definitely awarded to her.

The minorities treaties were alike in all essentials, differing only from state to state as special provisions were made to meet exceptional circumstances. In general they removed all restrictions on the use of languages, on the exercise of any religion not injurious to public welfare, and on the press and right of free speech, free assemblage, and free association, etc All languages were to be given adequate facilities before the courts. All racial, linguistic, and religious minorities were to have the right to establish, manage, and control, at their own expense, charitable, religious, and social institutions and schools. The national government, i.e. the dominant majority in the state, might make instruction in its official language obligatory in all schools, only providing it offered adequate and reasonable facilities for other languages used by the people within its frontiers.

These stipulations were primarily guaranteed by the Great Powers, but they were also declared "objects of international concern over which the League of Nations has jurisdiction." Any member of the Council was empowered to call attention to infractions of a minority treaty, and disputes as to law and fact might in certain instances be referred to the Permanent Court of International Justice for final decision. When it came into existence, the League of Nations assumed control. It was early decided that under ordinary circumstances, when the Secretariat received a petition from a minority, it was to communicate it to the government concerned before passing it on to the Council, in order to allow the government to examine the charges and to state its position. The whole matter was then to be studied by a Council committee, and if action were deemed necessary, the Council was authorized to take suitable measures for the observance of treaty obligations. Czecho-Slovakia very soon won an honorable renown by the readiness with which she gave all necessary information to the League regarding her treatment of minorities and her whole-hearted fulfillment of treaty pledges. But the attitude of Poland and Rumania did not prove to be so coöperative.

In addition to watching over the observance of Minorities Treaties signed at the Peace Conference, the League obtained declarations from various Powers, on their admission into the League, with regard to the protection of minorities. On Sept. 22, 1921, Albania signed a declaration promising besides other things to provide "an electoral system giving due consideration to the rights of racial, religious, and linguistic minorities," to give full detailed information, and to "take into account any advice it might receive from the League of Nations with regard to the question." Similar declarations were obtained in 1921 from Lithuania and in 1922 from Esthonia and Latvia. In the case of Finland, the Council resolved (Oct. 2, 1921) that under existing internal laws, minorities were protected, and a declaration was needless The Great Powers made no pledges regarding themselves, but the Third Assembly of the League (1922) formally "expressed the hope that states not bound to the League by any legal obligations, such as that contained in the Minorities Treaties, would nevertheless observe in their relations with racial, religious, or linguistic minorities, at least the same degree of justice and tolerance as is required by the treaties watched over by the Council."

The protection of minorities was certainly not completely achieved, but a long step forward was taken in providing international machinery to achieve that end. Some thinkers objected to the Minorities Treaties as a potential source of great trouble. Says one writer:

"Equality of treatment to the degree specified in the treaties places restrictions upon the action of a people in making laws or modifying their constitution that may prove unendurable. Such restrictions are really a limitation of national sovereignty respecting internal affairs. They are justifiable only if the League of Nations will see that the minorities do not become a privileged class and do not carry on ceaseless and unjustifiable agitation. In the United States there is solidarity, in part through a common language. In Central Europe the languages of the minorities are retained, and the state is compelled to countenance and even to develop them. Linguistic differences will be perpetuated and even increased. Irredentism will continue. Many of the wisest men of Europe and America deprecate these treaties; they regard them as a standing invitation to quarrel.

"The extraordinary hatred of one people for another through Central Europe will be lessened only if the processes of migration (and assimilation) are added to strong economic revival Hatreds are difficult to maintain in the face of profitable trade. Unless tendencies mitigating hatred are cultivated, the Minorities Treaties will be worthless; if natural tendencies toward friendship can be created, the Minorities Treaties will become obsolete."

RACING. See SPORTS.

RADCLIFFE COLLEGE. A college for women at Cambridge, Mass., founded in 1879. Instruction is given by members of the Harvard faculty. Most of the courses of study are identical with courses of study offered in Harvard, and all the courses are of the same grade as those given at Harvard. The enrollment in 1914 and in 1921 was exactly the same, 628 students, and in the years between approximated that figure, but in 1922 the number jumped to 728, and in 1923 to 852. The total number of graduate students enrolled on Nov. 1, 1923, was 212. The faculty was increased during the decade from 136 to 148 members, and the library from 32,000 to 50,000 volumes. Due largely to an endowment campaign held in 1921 the productive endowment of the college was increased from approximately $1,000,000 in 1914 to $3,000,000 in 1923–24. Briggs Hall, a new dormitory, equipped to house 72 students, was under construction in 1923. In September, 1923, Ada Louise Comstock, LL.D., Litt.D., L.H.D., succeeded Le Baron Russell Briggs, LL.D., Litt.D., as president.

RADIOACTIVE ELEMENTS. See CHEMISTRY.

RADIO COMMUNICATION. See PHYSICS.

RADIO COMPASS. See NAVIGATION and RADIO TELEGRAPHY.

RADIO TELEGRAPHY. The introduction of continuous or sustained waves instead of the damped waves of the former spark sets marked a very important change in radio telegraphy and gave birth to radio telephony (q.v.). Although continuous waves were produced for

radio by machine generators many years ago, it was not until the Poulsen Arc came into vogue that the continuous waves (C.W.) were much used in practice. This method was soon superseded by the Alexanderson high frequency generator, which in turn was being superseded by the oscillating vacuum tube set.

The improvements in vacuum tubes (three-electrode thermionic tube) in the 10 years since 1914 were notable. The introduction of the thoriated filament enormously increased the electron emission and made possible tubes of higher efficiency and greater capacity. With the thorium-impregnated filament the power required for the filament was reduced to about one-quarter that used previously and a small tube was made requiring only 0 18 watt in the filament, while for the convenience of the amateur a tube was developed the filament of which can be supplied by one standard size dry battery (1 volt and 0.25 amperes). A tube capable of dissipating 250 watts in its plate circuit is now a standard and tubes have been built for an output of 20 kilowatts using 12,000 to 15,000 volts on the plate. In this tube the anode (plate) is the container and water cooling is employed In commercial practice a life of 4000 hours is expected of tubes and it is stated that it is possible to get 100 kilowatts in the antenna with a bank of tubes, while a 4 kilowatt in the antenna was standard practice in radio telegraphy (Marconi)

The organization of the Radio Corporation of America in 1919 brought together several operating and manufacturing companies controlling interdependent patents and put at the disposal of one organization most of the important United States patents relating to radio in general and to tubes in particular.

In radio telegraphy the construction of continuous wave generators of the Alexanderson type in sizes of 200 kilowatts with incidental speed, frequency and voltage controlling devices marked an important step forward in transoceanic communication. Marconi stated that sending apparatus and antennæ had been improved to the point where 35 per cent of the plate output and 50 per cent of the antenna input were radiated into the ether The use of machine senders employing prepared tape increased the regularity, accuracy and speed of sending, while the automatic receiver using a beam of light playing on a sensitized photographic tape made it possible to receive at the rate of 100 words per minute under exceptional conditions and at 50 words per minute under normal conditions. The speed of transmission in 1924 was from 10 to 12 times that accomplished in 1912.

The Heterodyne or beat-note receiver with amplification by tubes increased the sensitiveness of the receiver The directive antenna further increased the selectivity, while the combination of two or more such antennæ with a device called the "barrage receiver" which combines two circuits so that an interfering signal from a near-by sending station is neutralized out, while the desired signal is amplified, made possible duplex radio. This is the simultaneous sending and receiving of messages between two given stations. Thus a sending station located at New Brunswick, N. J., and its receiving station at Belmar (later at Riverhead, L. I.) could work simultaneously.

The "wave antenna" came a little later. This is a very long straight horizontal antenna having a length approximately that of one wave (15,000 meters). It is pointed in the direction from which a desired signal comes and the end at which the signal arrives is grounded by a suitable resistance to prevent wave reflections. Static coming from any other direction than that of the signal is practically eliminated as the antenna is not sensitive to waves coming crosswise and any undesirable effects coming in a direction opposite to that of the signal dissipate themselves in the resistance.

In 1921, the Radio Corporation put into operation its radio central at Rocky Point, L. I., for general transoceanic service. This had a large transmitting antenna and nearby, at Riverhead, one receiving antenna. The transmitting antenna consisted of 12 wires, 7500 feet long, operating at 135,000 volts, which was supplied by 200-kilowatt generators. It could send two messages simultaneously at wave lengths of 16,465 and 17,500 meters. The receiving antenna consisted of two wires, 9 miles long (15,000 meters) and was of the wave and directive type. On it six messages from different parts of Europe could be received at the same time at reasonably different wave lengths (2 per cent). Both the sending and receiving of messages was controlled from the main station in New York City and no manual relaying was required. The speed of transmission was from 40 to 100 words per minute.

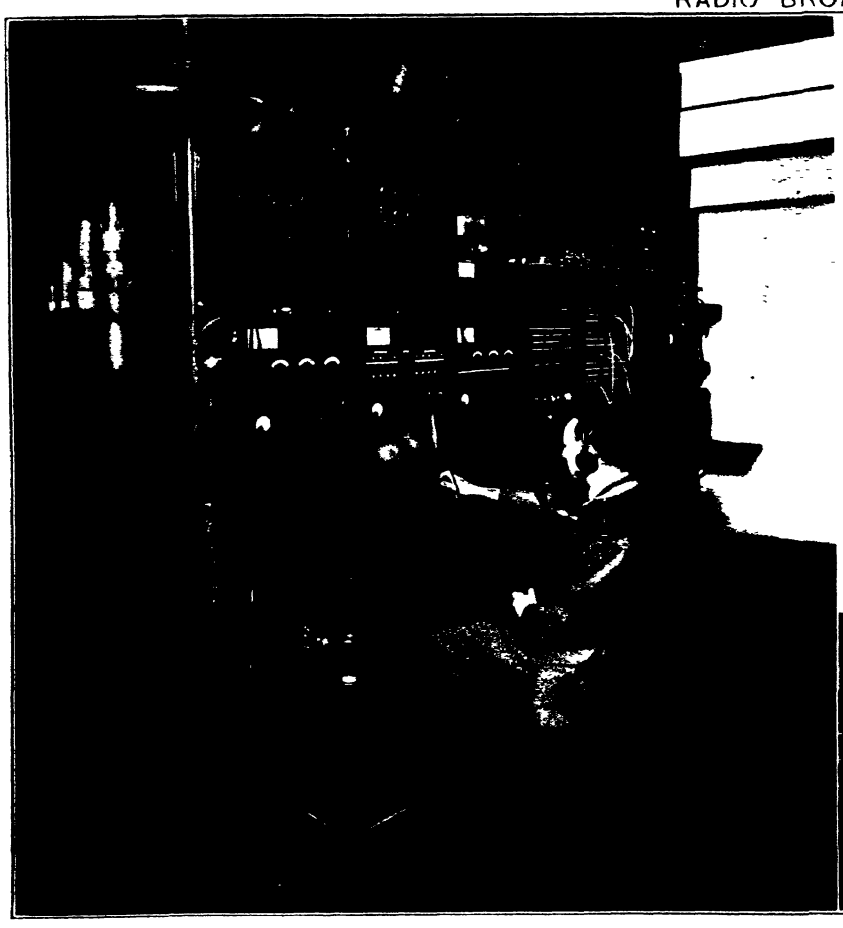
In 1922, regular radio telegraph service was established between San Francisco and Hawaii and Japan by means of a sending and a separate receiving station in the neighborhood of San Francisco with the control in the main office in San Francisco.

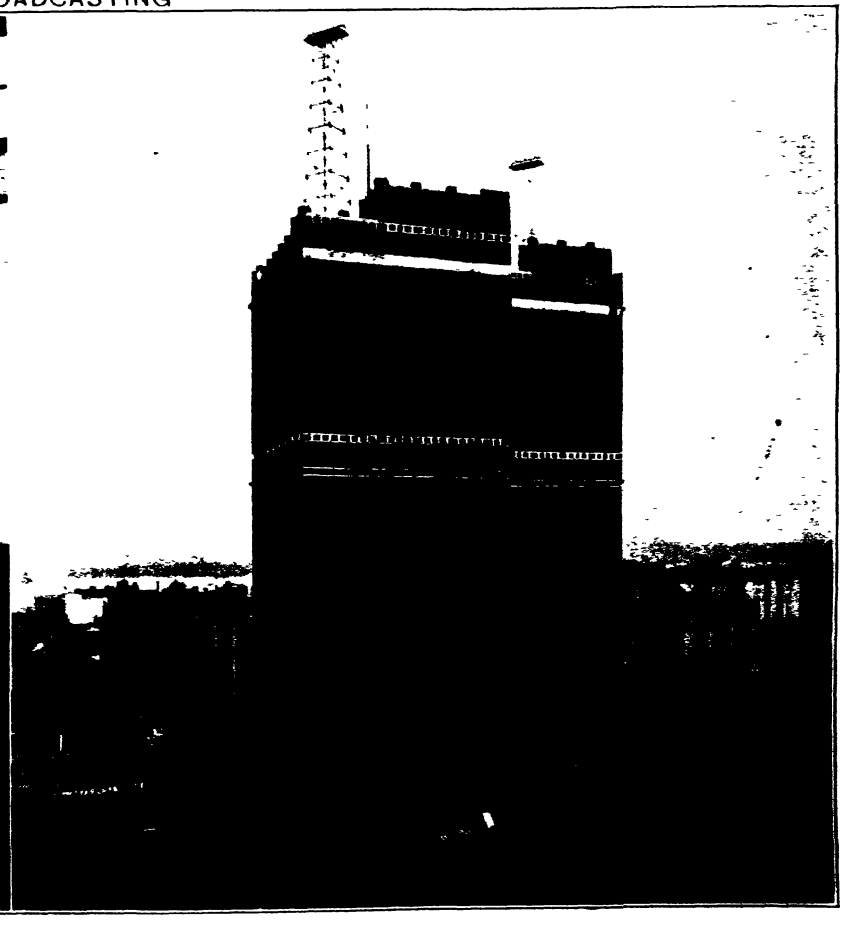
Recent experience has shown that radio waves are refracted and deflected by layers of the atmosphere of differing densities and character Thus it had been found that after crossing the ocean the waves arrive from a direction at quite an angle with the true direction between sending and receiving stations and that this deflection changes from hour to hour.

During the War, radio communication between airplanes, both by telegraphy and telephony, was developed to a practical success and received a further practical demonstration on the occasion of the flight of the United States Navy airplane *NC4* across the Atlantic, as it was almost continuously in communication with radio stations.

Radio Compass. The directive receiver, based on the invention of Bellini-Tosi, made possible the "radio compass" which is in regular service on both the Atlantic and Pacific coasts. Two such stations are located some miles apart on the coast. As a ship at sea sends out radio signals, the operator at each station manipulates its directive antenna until the intensity of the received signals indicates the bearing of the ship from that station. From the readings of the two stations and their distance apart the exact location of the ship may be found by triangulation. This information is then sent to the ship.

Bibliography. Many works on radio communication have been published and appear from time to time. Those that can be recommended include: Lauer and Brown, *Radio Engineering Principles* (New York, 1920); Morecroft, *Principles of Radio Communication* (New York, 1920); Signal Corps, United States





RADIO BROADCASTING FROM STATION WEAF OF AMERICAN TELEPHONE & TELEGRAPH CO., NEW YORK, N. Y.

Input control board showing the speech input amplifiers which augment the microphone currents from the studios to the correct value for transmission over the long dis

Antenna system of Radio Broadcasting Station WEAF on the Walker Lispenard Building, New York City. The aerial wires are carried by latticed steel masts designed to

Army, *Radio* (Washington); and Institute of Radio Engineers, *Transactions*. See RADIO TELEPHONY.

RADIO TELEPHONY. Radio telephony came into very general use during the War, particularly for military purposes over short distances. Before that it had been in an experimental stage. The first demonstration of long-distance telephony was the sending of a voice message from Arlington, near Washington, D. C., to Honolulu and to Paris on Oct. 23, 1915. Vacuum tubes were used to supply the power for this experiment and it was considered a great accomplishment that the message was intelligible and the voice recognizable. In 1919, a telephone message was sent from Washington to New Brunswick, N. J. and from there sent by radio to President Wilson on board the U.S.S. *George Washington* on the Atlantic. On Jan 14, 1923, conversation was maintained for some hours between Arlington and London, England. This was accomplished by a scheme of eliminating the carrier wave after it had been modulated, and transmitting only the frequencies known as the side-band, thus reducing the power required and the range of frequency used. This proved that trans-Atlantic telephony was entirely practicable and only awaited economic justification. Since then the programmes of American broadcasting stations have been frequently heard in England

In 1920, regular radio telephone communication was established between the cities on the Pacific coast of the North American continent and Avalon on Catalina Island by interlinking the telephone system of the mainland with that on the island by means of radio telephony. It is possible to get connection from a private station on the mainland to one on the island in the same manner as any long-distance call is obtained.

Broadcasting. Broadcasting by radio by 1924 had become not only a national pastime in the United States but almost a necessity and an essential part of American economic, political, and social life The growth of broadcasting stations was so rapid that in 1924 there were several hundred in the United States and it became necessary for the Department of Commerce systematically to license them and allot wave lengths and time schedules in order to prevent annoying confusion. From the beginning these stations used vacuum tubes as their source of power. A few were permitted to use 1000 watts in the antenna, but the majority employed 250 or less. There had been a continuous improvement in the technique of their operation and this had extended their range almost as much as the increase in power used. By a natural and healthy growth the standards of technical operation and the quality of the material in their programmes improved greatly so that they justified themselves as national educators

Important market, agricultural and financial news was sent out, as well as sporting news, university lectures, church services and music of all classes including the highest. This service was free to any possessor of a receiving set, and might be considered a very striking economic phenomenon and differentiating the United States from almost all other countries. In many of the latter the owner of a receiving set was forced to pay a tax, license fee or rental for the privilege, and in some countries he was limited to receive from only one broadcasting station.

The radio repeating station was a new technical development introduced in 1923. By this means one large important broadcasting station, which is so located that it can obtain the best talent for its programmes, broadcasts to its immediate neighborhood at some wave length from 250 to 600 meters, and in addition sends out the same programme on the wave length of about 100 meters, which will not interfere with any broadcasting. This 100-meter wave picked up by various subordinate stations, hundreds of miles away, is converted to a standard broadcasting wave length, amplified and sent out to its immediate neighborhood. This gives the people in an out-of-the-way part of the country the same programme as those in the large cities without the necessity of buying elaborate receiving sets and with less interference than if received directly.

After 1919 there was a wonderful development in the production of simple and efficient receiving sets as well as elaborate and sensitive sets. By 1924 it was possible to obtain a simple set at reasonable cost which would receive very well with a good antenna the programme of the local broadcasting station, while for receiving from a great distance sets were available which while fairly complicated in their construction, were very simple to operate. For the city dweller in an apartment who could not have an outdoor antenna the coil or "loop" antenna served as a substitute. This is a flat coil of 20 to 30 turns in the form of a square of about 30 inches on a side. It receives very well if three or four stages of amplifications are used and may be used inside a building. It is quite sensitive to direction and must be turned with its plane in the line of the signals.

The Neutrodyne was the trade name of a popular set usually consisting of five tubes, two radio frequency amplifiers, a detecter and two audio frequency amplifiers, with a special condenser connected between the grid of each of the radio frequency amplifiers and a middle point of the secondary of the transformer to the next step The object of this connection is to stabilize the operation by neutralizing the effect of the capacity between the grid and plate and their leads

The reflex is a general name given to a popular type of circuit in which a crystal is used as a rectifier or detecter and tubes are used both for radio and audio frequency amplification. By an ingenious arrangement of circuits, one tube may be used twice, once for radio frequency amplification and once for audio frequency amplification. The claim that the crystal gives a better quality of reproduction appeared to be justified.

Superheterodyne. The Superheterodyne of Armstrong was a combination of circuits for receiving radio messages which received much publicity. It is based on the beat-note principle and gives very strong signals from a loop or coil. The incoming signal is tuned in the loop circuit and then impressed upon an oscillating tube circuit which is tuned to give a beat note of a definite frequency with the incoming signal. This beat note is sent through two or three amplifying tubes and circuits which are very accurately tuned to the definite beat note, which is the same for all signals. This amplified beat note is then rectified (detected) and amplified

Army, *Radio* (Washington); and Institute of Radio Engineers, *Transactions*. See RADIO TELEPHONY.

RADIO TELEPHONY. Radio telephony came into very general use during the War, particularly for military purposes over short distances. Before that it had been in an experimental stage. The first demonstration of long-distance telephony was the sending of a voice message from Arlington, near Washington, D. C., to Honolulu and to Paris on Oct. 23, 1915. Vacuum tubes were used to supply the power for this experiment and it was considered a great accomplishment that the message was intelligible and the voice recognizable. In 1919, a telephone message was sent from Washington to New Brunswick, N. J. and from there sent by radio to President Wilson on board the U.S.S. *George Washington* on the Atlantic. On Jan 14, 1923, conversation was maintained for some hours between Arlington and London, England. This was accomplished by a scheme of eliminating the carrier wave after it had been modulated, and transmitting only the frequencies known as the side-band, thus reducing the power required and the range of frequency used. This proved that trans-Atlantic telephony was entirely practicable and only awaited economic justification. Since then the programmes of American broadcasting stations have been frequently heard in England

In 1920, regular radio telephone communication was established between the cities on the Pacific coast of the North American continent and Avalon on Catalina Island by interlinking the telephone system of the mainland with that on the island by means of radio telephony. It is possible to get connection from a private station on the mainland to one on the island in the same manner as any long-distance call is obtained.

Broadcasting. Broadcasting by radio by 1924 had become not only a national pastime in the United States but almost a necessity and an essential part of American economic, political, and social life. The growth of broadcasting stations was so rapid that in 1924 there were several hundred in the United States and it became necessary for the Department of Commerce systematically to license them and allot wave lengths and time schedules in order to prevent annoying confusion. From the beginning these stations used vacuum tubes as their source of power. A few were permitted to use 1000 watts in the antenna, but the majority employed 250 or less. There had been a continuous improvement in the technique of their operation and this had extended their range almost as much as the increase in power used. By a natural and healthy growth the standards of technical operation and the quality of the material in their programmes improved greatly so that they justified themselves as national educators

Important market, agricultural and financial news was sent out, as well as sporting news, university lectures, church services and music of all classes including the highest. This service was free to any possessor of a receiving set, and might be considered a very striking economic phenomenon and differentiating the United States from almost all other countries. In many of the latter the owner of a receiving set was forced to pay a tax, license fee or rental for the privilege, and in some countries he was limited to receive from only one broadcasting station.

The radio repeating station was a new technical development introduced in 1923. By this means one large important broadcasting station, which is so located that it can obtain the best talent for its programmes, broadcasts to its immediate neighborhood at some wave length from 250 to 600 meters, and in addition sends out the same programme on the wave length of about 100 meters, which will not interfere with any broadcasting. This 100-meter wave picked up by various subordinate stations, hundreds of miles away, is converted to a standard broadcasting wave length, amplified and sent out to its immediate neighborhood. This gives the people in an out-of-the-way part of the country the same programme as those in the large cities without the necessity of buying elaborate receiving sets and with less interference than if received directly.

After 1919 there was a wonderful development in the production of simple and efficient receiving sets as well as elaborate and sensitive sets. By 1924 it was possible to obtain a simple set at reasonable cost which would receive very well with a good antenna the programme of the local broadcasting station, while for receiving from a great distance sets were available which while fairly complicated in their construction, were very simple to operate. For the city dweller in an apartment who could not have an outdoor antenna the coil or "loop" antenna served as a substitute. This is a flat coil of 20 to 30 turns in the form of a square of about 30 inches on a side. It receives very well if three or four stages of amplifications are used and may be used inside a building. It is quite sensitive to direction and must be turned with its plane in the line of the signals.

The Neutrodyne was the trade name of a popular set usually consisting of five tubes, two radio frequency amplifiers, a detecter and two audio frequency amplifiers, with a special condenser connected between the grid of each of the radio frequency amplifiers and a middle point of the secondary of the transformer to the next step The object of this connection is to stabilize the operation by neutralizing the effect of the capacity between the grid and plate and their leads

The reflex is a general name given to a popular type of circuit in which a crystal is used as a rectifier or detecter and tubes are used both for radio and audio frequency amplification. By an ingenious arrangement of circuits, one tube may be used twice, once for radio frequency amplification and once for audio frequency amplification. The claim that the crystal gives a better quality of reproduction appeared to be justified.

Superheterodyne. The Superheterodyne of Armstrong was a combination of circuits for receiving radio messages which received much publicity. It is based on the beat-note principle and gives very strong signals from a loop or coil. The incoming signal is tuned in the loop circuit and then impressed upon an oscillating tube circuit which is tuned to give a beat note of a definite frequency with the incoming signal. This beat note is sent through two or three amplifying tubes and circuits which are very accurately tuned to the definite beat note, which is the same for all signals. This amplified beat note is then rectified (detected) and amplified

again by audio amplification if desired. The set contains as many as eight tubes and requires very careful tuning of the beat note circuits. The principal advantage is that there is no radio frequency amplification with its attendant instability, but the amplification is done at a much lower frequency (usually 50,000 to 100,000 cycles).

Radio to Moving Trains. It was found entirely practicable to receive radio signals, either telegraphic or telephonic, on a moving train either from near-by stations of the railroad company or from the general broadcasting stations. The original intention of this was to transmit instructions to the train crews while traveling between stations, but its most general use was to furnish entertainment for the passengers. See RADIO TELEGRAPHY and consult for reference works mentioned there under *Bibliography*.

RADITCH, STEPHEN. See JUGO-SLAVIA, *History*.

RADIUM AND RADIUM MINERALS. Radium is a metal with a white metallic lustre. It has been isolated only once or twice, and few persons have seen it. It is ordinarily obtained from its ores in the form of sulphate, chloride, or bromide, and is usually sold and used in the form of these salts. These are all white or nearly white substances. Radium, radium salts, and radium minerals are not generally luminescent. Tubes containing radium salts glow mostly because they include impurities which the radiations from the radium cause to give light. Radium is found in nature in such exceedingly small quantities that it is never visible even when the material is examined with a microscope. Radium ore ordinarily carries only a small fraction of a grain of radium to the ton; radium will never be found in large masses, because it is formed by the decay of uranium, a process that is wonderfully slow; and radium itself decays and changes to other elements so rapidly that it does not accumulate naturally in visible masses.

Original radium minerals, such as uraninite, samarskite, and brannerite, are black and have a shiny fracture and a high specific gravity. They are rarely found in commercially valuable quantities. Pitchblende, which has the same composition as uraninite and the same general appearance except that it shows no crystal form, occurs in veins. It has been found in a few places only—in Bohemia, southern Saxony, Cornwall, and Gilpin County, Colorado. When these minerals break down through weathering, other radium minerals are formed from them, such as autunite, torbernite, carnotite, and tyuyamunite. Carnotite and tyuyamunite are the most abundant of these minerals and in 1924 were furnishing the bulk of the world's radium. Both are bright canary yellow in color and are powdery, finely crystalline, or, rarely, claylike in texture Carnotite is a hydrous potassium-uranium vanadate. Tyuyamunite is similar in composition but contains lime instead of potash. The greatest known deposits of these two minerals are in southwestern Colorado and southeastern Utah, where both are associated with fossil wood and other vegetation in friable, porous, fine-grained sandstone. Small quantities of carnotite have been produced near Olary, South Australia. The only other deposits that yield tyuyamunite in notable quantity are those of Tyuya-Muyun, in the Andidjan district, Ferghana government, central Asiatic Russia (Russian Turkestan), where tyuyamunite occurs with rich copper ores in a pipe in limestone (see below).

Radium Industry. An important radium industry was started in the United States during the War, utilizing the carnotite deposits in Utah. This, however, was rather short-lived as by 1922 the cheap production of radium from the rich altered pitchblende deposits near Elizabethville in the Belgian Congo controlled by the Union Minière du Haut Katanga Company, rendered it impossible to work at a profit the carnotite deposits of Colorado and Utah. As a result of this changed condition capital amounting to several million dollars invested in mines, plants for the isolation of radium, vanadium, and uranium, and for the manufacture of apparatus for the handling of radium was rendered nonproductive. The United States Radium Company in 1923 made an effort to isolate radium in the United States but only on a small scale, while the Standard Chemical Company operated on an experimental basis its mill in Colorado for the concentration of the vanadium-bearing sandstone associated with the carnotite deposits.

The price of radium had been $120,000 a gram but in 1922 it had fallen to $70,000 per gram. American companies, after closing down their own mines, undertook to market the African product and up to 1924 that material ruled the market. The Katanga ore was shipped to Oolen, about 40 miles from Antwerp, Belgium, where it was treated at the plant of the subsidiary company. This single plant was said to have a capacity of 3 grams of radium (element) per month, which was about the total capacity of all the plants that once operated in the United States.

Interest also was aroused by the report of a Soviet Commission on ore deposits at Tyuya Muyun, in Russian Turkestan. The ore was believed to be tyuyamunite, hydrous calcium-uranium vanadate, and according to the commission there was sufficient ore of good grade to yield 15 to 20 grams of radium, 60 tons of uranium, 90 tons of vanadium, and 120 tons of copper. Even on this basis, however, the ore would be too lean to compete successfully with that from Katanga. In Portugal one of the mines worked during the year 1923 was said to yield an ore carrying as much as 6 per cent of uranium oxide, while in Madagascar and in Cornwall certain ore deposits also were worked. There was, however, every reason to believe in 1924 that the Belgian interests would be able to control the markets of the world for some time and that prices would continue to stand firm.

RAILWAY LABOR BOARD. See RAILWAYS.

RAILWAYS. After the United States entered the War there was a short period during which an attempt was made to continue the operation of American railways under private management, but under the authority of the War Department and other governmental agencies. Priority orders were the cause of the failure of this attempt and led to government operation of the railroads.

Priority orders were designed to expedite the movement of such freight as was most urgently required. This, of course, required discrimination between different classes of freight, and such discrimination was supposed to rest with

the military authorities at Washington. It soon became expedient to delegate this authority to subordinate officers, and conflicting priority orders brought about so great a confusion that railroad operation generally became demoralized

The final effort to avert government operation was made when a committee of five railroad men —consisting of Fairfax Harrison, president of the Southern Railway, Samuel Rea, president of Pennsylvania, Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific; Hale Holden, president of the Chicago, Burlington, and Quincy, and Howard Elliot, formerly president of the New York, New Haven and Hartford—was appointed by the Association of Railway Executives and other executives at a meeting held in Washington, Apr. 11, 1917. At this meeting the executives pledged themselves to follow the orders of the committee, which they had themselves elected, regardless of competitive conditions and the individual necessities and preferences of each road Most of the executives called meetings of their boards of directors and had their action, in thus delegating their authority, confirmed by vote of the board.

Had it not been for the continual conflict of priority orders this experiment might have worked out, although even under the stress of war conditions and the stimulation of patriotic desires, it was found almost impossible to overcome the habits and prejudices of a lifetime of competition Even with the sincerest desire to be of use to the country, some railway executives found it nearly, if not quite impossible to carry out orders that would result in loss to their company and gain to a competitor.

The opportunity to show what cooperation, intelligence and genius could do when actuated by disinterested motives was as great as anything that American railway history has presented. Heretofore the greatest mileage which had ever been under the direction of one man in the United States was the Harriman system of approximately 23,000 miles Such a system, however, was competitive throughout its length with other independently operated railroads. The Fairfax Harrison committee had pledged to it the cooperation of the managers of 260,000 miles of railroad, and the complete elimination of competition. The greatness of the opportunity and the undoubtedly sincere desire of most of those concerned in the experiment was not sufficient to make it a success.

On Dec. 26, 1917, President Wilson issued a proclamation fixing Jan 1, 1918, as the date on which the executive branch of the United States government should take charge of the operation of the principal railroads of the United States. William G. McAdoo, Secretary of the Treasury, was appointed Director-General of Railroads, and on January 1 took over the properties. On Jan. 28, 1918, Congress passed a law embodying the terms under which the government operated the railroad properties Under this law the government took over the supplies and all current assets as of Jan 1, 1918, and assumed the payment of railroad employees' and officers' salaries, and of all the expenses of operation. It likewise collected freight and passenger revenues Thus, the railroad properties, including their current assets, were rented to the government for a fixed annual sum equal to the average operating income for the three years ended June 30, 1917. It was agreed that the government should make such additions and betterments to the properties as was found necessary to enable them to satisfactorily perform the service, first, of carrying supplies for the government and moving of troops, and second, of performing the civilian requirements for movement of freight and passengers.

It was found necessary to make a separate contract between the government and each one of the railroad companies. An attempt was made to standardize this contract on the basis of the annual rental equal to the average annual net operating income for the three years ended June 30, 1917. The majority of the railroad companies signed this standard contract, but others refused to sign it and were operated during the entire period of government operation with the basis of their rental undetermined.

The Government's Railroad Organization. The Director-General formed a staff which included an Assistant Director-General, a Division of Law, a Division of Finances and Purchases, a Division of Operation, a Division of Traffic, a Division of Capital Expenditures, a Division of Labor, a Division of Public Service and Accounting, and an Actuary to the Railroad Administration. The country was divided at first into three regions, eastern, northwestern, and southwestern. A. H Smith, president of the New York Central, was made director of the Eastern Region, R H. Aishton, president of the Chicago & North Western, was made director of the Northwestern Region and C. H. Markham, president of the Illinois Central, was made director of the Southwestern Region It was soon found necessary to expand this organization, and the country was divided into seven regions. The eastern region included the territory bounded on the north by Canada, on the west by Lake Michigan and the Indiana-Illinois State line, and on the south, roughly, by the Pennsylvania line, from Philadelphia to Chicago. The Allegheny region took in the Pennsylvania Railroad as far west as Pittsburgh, the Baltimore and Ohio line as far west as Pittsburgh, and the other lines in that territory which included New Jersey, the greater part of Pennsylvania, Delaware, Maryland, and the northern slice of West Virginia. The Pocahontas region included the principal bituminous coal roads, the Norfolk and Western and the Chesapeake and Ohio, and other roads in Virginia, and the larger part of West Virginia, and part of Kentucky. The southern region included all of the southeastern States from the North Carolina-Virginia line south to the gulf, and west to the Mississippi. The northwestern region included the territory bounded on the north by Canada, and on the east by Lake Michigan, and on the south by a line running irregularly from Chicago to the southern boundary of Oregon, and on the west by the Pacific. The central western region was bounded on the north by this southern line of the northwestern region, on the east by the Illinois-Indiana State line, on the south by a line zigzagging southwest from Cairo, Ill, to the southern boundary of New Mexico, and on the west by the Pacific. The southwestern region was bounded on the north by this southern boundary of the central western region, on the east by the Mississippi, and on the south and west by the Gulf of Mexico, and Mexico.

In his instructions to regional directors, Director-General McAdoo said, "Broadly speaking, I wish to give you power to direct railroad operations in your territory so as to handle traffic with the least congestion, the highest efficiency, and the greatest expedition. . . . I have put upon you responsibility for the entire operating situation." Notwithstanding this responsibility, however, the regional directors were not given the authority to appoint officers actually in charge of the operation of the railroads in their territory. The Director-General appointed "Federal managers" and "general managers" The Federal manager or general manager was in charge of a particular railroad. The difference in titles is a difference in the size of the road managed, and presumably in the salary. Thus, a Federal manager was appointed for the New York, New Haven, and Hartford, while a general manager was appointed for the Central Vermont

In making his appointments, both for the central administration and the regional administrations, the Director-General selected railroad men of long experience and marked ability. Thus, Carl Gray, of the division of operation, was chairman and president of the Western Maryland, and formerly had been president of the Northern Pacific. Edward Chambers, director of the division of traffic, was vice president of the Atchison, Topeka, and Santa Fé, and Robert S. Lovett, director of the division of capital expenditures, was chairman of the executive committee of the Union Pacific. One of the ablest of railroad lawyers, Walker D. Hines, chairman of the board of the Atchison, Topeka and Santa Fé, was appointed assistant director general. As regional directors, there were A. H. Smith, president of the New York Central, C. H. Markham, president of the Illinois Central, Hale Holden, president of the Chicago, Burlington, and Quincy, B. F. Bush, president of the Missouri Pacific, etc. In the appointment of Federal and general managers, in general, the chief operating officer of the road under the old corporate management was appointed under the government organization In cases where the president of the road was its chief operating officer, rather than the controlling interest in the management of the company, he was appointed Federal manager. Thus, E. J. Pearson, president of the New York, New Haven, and Hartford, was made Federal manager of the road. On the other hand, where the president of the company was an executive, rather than an operating officer *employed* by the board of directors, he did not enter the government service, but remained as an officer of the corporation. Thus, Samuel Rea, president of the Pennsylvania, did not become Federal manager of the Pennsylvania, but remained an officer of the corporation, and Elisha Lee, who had been general manager of the Pennsylvania lines east of Pittsburgh, was appointed Federal manager. The line of cleavage between the men who remained corporate officers and those who were appointed Federal managers might form the basis of immensely interesting study, not only in railroad development, but in the economic development of any great American industry. Mr. McAdoo fixed the salary of regional directors and Federal and general managers high enough to command the services of the long experienced, successful, and able railroad officers. On the other hand, he did not take into his organization men to whom a salary, even of $50,000 a year, was not of paramount importance, and, it might be mentioned, men whose services could not be measured by a salary, however great. The value of an E. P. Ripley to the Atchison, Topeka, and Santa Fé, of an L. F. Loree to the Delaware and Hudson, or a Samuel Rea to the Pennsylvania is something that cannot be purchased for so much a month, or so much a year.

The regional directors were given authority to operate the roads in their territory, subject only to general orders from the central administration The actual responsibility of operating the roads, however, fell on the Federal and general managers. Furthermore, general orders included orders dealing with wages and working conditions. Thus, the authority of the Federal manager was in part taken away by the regional director, and in part undermined by the central administration in its dealings direct with labor. In the opinion of probably the majority of railroad officers, high and low, this separation of authority from responsibility proved a great weakness in the railway organization.

The Labor Situation. The first order issued by the Director-General was one calling upon employees to continue in the performance of their regular duties. This was on December 29. On December 31, the railroads' war board resigned and on January 21, a railroad wage commission was organized, consisting of Franklin K. Lane, Secretary of the Interior, C. P. McChord, member of the Interstate Commerce Commission, J. Harry Covington, chief justice of the Supreme Court of the District of Columbia, and William R. Wilcox, formerly of the New York public service commission. This board listened to the testimony of various classes of railroad employees, and early in March made a report in which it recommended that an advance in wages be given to all employees, on a sliding scale of percentages, figured on the rates of pay in effect in December, 1915, these percentages ranging from a maximum of 43 per cent for the man receiving $46 or less a month to no increase for the man receiving $250 a month or more. The basis of the award was the increased cost of living. On May 25, the Director-General issued order No. 27, which gave the advances recommended in the committee's report, but advanced the wages of common laborers and shop men more than was recommended, this being found necessary in order to hold the men; the demand for common labor and for shop men in other industries was so great that the railroads had to meet the higher wages offered by these other industries. Order No. 27 was followed by many supplements which were, of course, in the nature of additional wage increases.

Thus, supplement No. 8, issued September 10, did away with the percentage advances in wages insofar as they applied to track laborers and track foremen, and gave a straight advance of 12 cents per hour to track laborers over the rate in effect Jan. 1, 1918, with a minimum of 28 cents and a maximum of 40 cents per hour. Track foremen were advanced $25 per month, with a minimum of $100 per month. Supplement No. 10 increased telegraphers', telephone operators', agent telegraphers', etc., wages by about $25 per month, with a minimum wage of $95 per month. In general, the application of Order No. 27 would have deducted any increases

in pay received since December 15 from the percentage increase that was made by the order, but the increase in wages which enginemen and trainmen received as the result of the eight-hour law, passed in 1917, was exempted, and they received the full increase provided in the order, without any deduction for the change from a ten- or nine-hour basis to an eight-hour basis. The wage awards in most cases were retroactive so that they applied to the entire calendar year 1918.

Rate Increases. On February 4 a bill embodying in general the principles laid down in President Wilson's proclamation taking over the roads was reported to the Senate, and on February 22 was passed by the Senate, on February 28 by the House, and was approved March 21 by President Wilson. In the meantime, demurrage rates, which are charges made by the railroad against a shipper who holds cars beyond a certain period, were increased, and the Director-General ordered that the expenses of financial and corporate officers as distinguished from operating, engineering, and traffic officers, should not be charged to the operating expenses of the railroad, thus making them a charge which had to be paid out of the rental received by the companies from the government. This was followed by the discontinuance of off-line traffic offices, and the discharge from service of traffic solicitors. On May 25 a general advance was made in freight and passenger rates All passenger rates were raised to a straight 3 cents a mile, with an additional charge of ½ cent a mile for occupants of Pullman cars This was an increase of 50 per cent in places in the East, and from 25 to 50 per cent in the West. The increase in freight rates was roughly 25 per cent. The greatest increase in freight rates that the railroads themselves had ever asked for was 15 per cent, and the Interstate Commerce Commission, even under war conditions, had refused to grant a straight 10 per cent increase. The increase made by the Director-General was, of course, in addition to all increases of less than 10 per cent allowed in the previous year by the Interstate Commerce Commission. The State commissions asked the administration to suspend rates, but this request was refused, and on July 1 it was announced that rates would be changed by the administration without waiting for the permission of the Interstate Commerce Commission. In November the charge of an extra ½ cent per mile for passengers traveling in Pullman cars was withdrawn, the pressure of public opinion and the expressions of discontent being so numerous that the railroad administration yielded to them, despite the fact that either on a theory of cost of service or of value of service the extra ½ cent charge was entirely justifiable and equitable.

The Equipment Situation. When the Director-General took charge of the roads there was a severe car shortage, due to congestion of traffic in New England and at the eastern seaboard. There was also a shortage of locomotives, in part due to the unparalleled demand for transportation, and in part to extraordinarily severe weather conditions.

In April, 1918, the Railroad Administration placed an order for 100,000 standard freight cars divided as follows: 25,000 40-ton double sheathed box cars; 25,000 50-ton single sheathed box cars; 20,000 50-ton composite gondola cars; 5000 70-ton low-side gondola cars; 25,000 55-ton hopper cars.

Notwithstanding the need for additional cars, only 13 per cent of the above order was delivered during 1918. Of the total 2030 standard locomotives ordered by the government, 678 were delivered up to December 21 During 1918, there were built 6475 locomotives, of which 3668 were on domestic orders, and 2807 on orders for the United States military railroads outside of the United States and Canada. In 1917, there were 5446 locomotives built, of which 2585 were for domestic service, and 2861 for export. In 1907, 7362 locomotives were built. There was a total of 124,708 freight cars built in the United States and Canada in 1918. This compares with 151,401 built in 1917, and 284,188 built in 1907. In 1918, there were 1573 passenger cars built, comparing with 2000 built in 1917, and 5457 built in 1907.

The United States Railroad Administration ordered 2030 standard locomotives for use in the United States. The first order, for 555 locomotives, was given to the American Locomotive Company, and one for 470 to the Baldwin Locomotive Works. This was supplemented by a further order for 249 locomotives from the American Locomotive Company, 100 from the Baldwin and 45 from Lima. The types of locomotives ordered were the standard heavy Mikado weighing 320,000 pounds with cylinders 27 x 30; the light Mikado weighing 290,800 pounds with cylinders 26 x 30; the light Mountain-type locomotive weighing 320,000 pounds with cylinders 27 x 30; the heavy Mountain-type locomotive weighing 352,000 pounds with cylinders 28 x 30; the light Pacific-type locomotive weighing 270,000 pounds with cylinders 25 x 28; the heavy Pacific-type weighing 300,000 pounds with cylinders 27 x 28; the light Santa Fé type weighing 352,000 pounds with cylinders 27 x 32 and the heavy Santa Fé type weighing 390,000 pounds with cylinders 30 x 32.

The discussion of standard types of equipment for railroads over the entire country was one which developed wide differences of opinion. Standardization had become so much a catchword that the railroad administration had no difficulty in convincing the general public of the great economies, both in the cost of building and of operation, of a few standard types of locomotives and cars. The corporations owning the railroads protested vigorously against drastic standardization. It would appear from testimony and discussion on this point that there were sound arguments for standardization of certain types of freight cars. Freight cars travel all over the country, and the advantages of having repair parts, etc., on whatever road the car might happen to be, are real, and of importance On the other hand, in general, locomotives are confined to service on the road that owns them, and more often than not, to a single operating division of that road. The Pennsylvania railroad, which has for years dealt with its locomotive and equipment problems in a more scientific way than any other company, had gone further toward designing locomotives especially for the work which they were to do, and for the division on which they were to operate, than had any other company.

Even after the Railroad Administration had relinquished control, the controversy between the Administration and railroad officers, working for the Administration but still loyal to the com-

panies which had employed them, had been forgotten, there were differences of opinion as to whether the standard design of locomotive was an economy in the long run and whether standardization of locomotive design was desirable and economical. The truth appears to lie somewhere in between the divergent views. The standard locomotives were better than those ordered prior to government operation by many roads. On the other hand, the standard locomotive was not as well designed a type for the particular nature of the work on some roads as the engineers of the private companies had designed.

Both cars and locomotives were ordered at a time when prices were at the peak. The Railroad Administration assigned—of necessity arbitrarily—cars and locomotives to the various properties as the needs of traffic seemed to require. This equipment, of course, became a capital charge against the railroads owning the various properties. Naturally there were protests against assignments and some friction between the Railroad Administration and the railroad executives. At about the time, however, that the railroads were returned to the owning companies a car shortage began to develop and the companies, in general, were willing to take the assignments made to them.

To finance these purchases the companies issued equipment trust certificates up to the full cost of the equipment and the Railroad Administration took these equipment trust certificates into its treasury. It had been customary for private companies, in financing the purchase of cars and locomotives, to issue equipment trust certificates against only 75 to 80 per cent of the total cost of the equipment, and for the company to furnish out of its current funds the 20 or 25 per cent equity. Since there was no equity in the so-called government equipments, it was thought that investors would be loath to buy from the government these equipment trust certificates which matured serially. It was found, however, that with strong companies like the Union Pacific, the Pennsylvania, and the New York Central, investors were very willing to buy equipment trust certificates even where there was no equity.

In the case of the weaker roads the government, in order to relieve itself of some of this burden, stamped 25 per cent of the equipment trusts as subordinate in lien to the other 75 per cent, and investment bankers found a comparatively ready market for the 75 per cent of certificates that were prior in lien to the 25 per cent the government continued to hold Eventually a good many of the so-called subordinated equipments were sold by the government to bankers and found their way into the hands of investors There were no defaults on any of these equipment trust certificates.

The railways, uncertain of their credit and of business generally, were loath to place orders for equipment after the roads were returned to their owners, and the orders for domestic locomotives in the last year of government operation and the first two years following government operation, were as follows: 214 in 1919; 1998 in 1920; 239 in 1921. By 1922, it had become obvious that the railroads would need a great many more locomotives and cars if they were to handle satisfactorily the business that appeared likely to develop in 1923. Orders were placed during 1922 for 2600 locomotives, 2382 passenger cars and 180,154 freight cars. Deliveries of the orders placed in 1922 were made in the latter part of 1922 and during the year 1923, and the railways met the requirements of the heavy crop movement of the fall of 1923 without serious car shortage.

Extensions. The government policy of railroad development rests on the belief that consolidation of facilities would result in economies. Extensions played almost no part in the government's programme. There was, therefore, very little new railroad building during all the period of government operation and the two years immediately following, but in 1923 there was a resumption of considerable railroad building. In 1918, there were 721 miles of railroad line completed; in 1919, 686 miles; in 1920, 314 miles; in 1921, 475 miles; in 1922, 324 miles, and in 1923, 427 miles.

Service. It is generally conceded to be quite unfair to use the quality of service furnished by the railroads under the Railroad Administration as a measure of government operation of railroads. Service in hotels, department stores, and every other branch of activity where employees come in contact with the general public, deteriorated under war conditions. Certain facts, however, may be pointed out as regards the operation of the railroads; the administration of labor was not delegated to the Federal managers but was controlled from Washington on what was generally conceded to be a political basis. The effect on wages is discussed elsewhere but the effect on service was quite important. Without effective control over the terms of employment it was quite impossible for the Federal managers to exact service to the public, and it is thought by some people that service of the railways was even more adversely affected than service in lines of industry that remained under private control

One item of service deserves special mention. The Railroad Administration undertook to change the dining-car system. A standard meal was served at a standard price—the dinner was $1.50. Exactly the same menu was served by the great majority of railroads and each day in the week had its standardized menu. The result might have been foreseen and protests were raised everywhere. Men who traveled day after day found the system thoroughly distasteful and the experiment served to show that, despite all the dissatisfaction there has been with private-company operation of American dining cars, the easy method of standardization is not the satisfactory way out.

Accounts with Government. The long and involved process of adjusting the accounts between the government and the railroads, which were taken under Federal control in December, 1917, and relinquished in 1920, had been concluded by 1924. The Railroad Administration had completed its settlements with all of the important roads which it operated. The Interstate Commerce Commission had completed the adjustment and had issued final certificates for payment by the Treasury Department of most of the accounts involved in the six-month guarantee allowed by the Transportation Act for the period following the termination of Federal control.

All the financial relations however, between the railroads and the government, arising from the War and the government's assumption of railroad operation, could not be terminated by

that year, because many railroads gave the government various forms of evidences of indebtedness for the capital expenditures made by the government, and there were still outstanding in 1924 many loans made by the Interstate Commerce Commission from the $300,000,000 revolving fund established by the Transportation Act to help tide over the transition period.

Railroad Administration Settlements. Of the 241,194 miles of road taken over by the government, roads operating 178,045 miles had effected final settlement before the year 1924 Except for the short-line roads, which had a different status, the settlements, which involved original claims of the railroads amounting to $1,014,511,000, were completed without litigation and a detailed report was being compiled Up to Dec. 1, 1923, the settlements represented original claims of $953,473,000, although some of them were reduced during the course of the negotiations This does not mean that the Railroad Administration had to pay out anything like that sum after February, 1920, because the amounts due the railroads on current account, such as delayed payments of their guaranteed compensation as well as amounts for materials and supplies, under-maintenance, depreciation, interest and other items, were offset against the amount of capital expenditures made by the government and charged against the companies. The Pennsylvania, for example, paid the government $90,000,000 as the excess of its indebtedness to the government over the government's indebtedness to it Some few roads paid the Railroad Administration for over-maintenance but up to December, 1923, the government had paid the railroads a net amount of $188,401,235 for under-maintenance, including $159,657,979 for maintenance of way and $28,743,256 for maintenance of equipment The roads had claimed an aggregate of $668,000,000 for under-maintenance A considerable part of the amounts owed by the railroads for capital expenditures was funded. In 1924, there were still pending a good many claims against the Railroad Administration on the part of short lines and "third persons" such as claims of shippers for overcharges and loss and damage claims.

Six-Month Guarantee. The claims of the railroads for the six-month guarantee amounted to about $657,000,000 but the Interstate Commerce Commission reduced the amount after checking the accounts. In 1920 it estimated the amount payable as about $536,000,000 and in two later annual reports it adhered to this estimate. As of Oct. 31, 1922, the commission estimated that $85,926,954 was still due the carriers Up to Oct. 31, 1923, final settlements had been made with 355 carriers, 110 cases had been dismissed and 202 cases were still to be disposed of. Certificates had been issued to the amount of $501,322,674 (and the actual payments by the Treasury approximate that amount), leaving an estimated balance payable of $34,677,325 which was somewhat reduced by additional certificates during the early part of 1924.

A total of 352 carriers, mainly short lines, had filed claims amounting to approximately $25,000,000 for reimbursement of deficits for the Federal control period under section 204 of the Transportation Act. At the date of its report the commission had certified $8,205,630 on this account and after many claims had been dismissed or withdrawn, 92 were left for final disposition.

Loan Fund. Under section 210 of the Transportation Act, which established the $300,000,000 loan fund, the commission has allowed loans to the amount of about $350,000,000, the original fund having been increased by interest and repayments. On Dec. 1, 1923, a total of $147,862,592 had been repaid Under the law loans subsequent to Feb 28, 1922, were made only on applications filed prior to that date but as recently as December 5 the commission allowed a loan of $7,000,000 to the Boston and Maine.

The statement of the Treasury Department on the subject, as of Dec. 1, 1923, shows total payments to the railroads under the Transportation Act amounting to $893,984,588, exclusive of the payments by the Director-General of Railroads, but this includes the loans, some of which have been repaid. During the year 1924, it should be possible to ascertain with some degree of accuracy the total cost to the government of Federal control of the railroads, which was estimated at $1,700,000,000 to $1,800,000,000, including approximately $550,000,000 for the six-month guarantee period and the reimbursement of short lines, but the exact figure can not be known as long as the loans and the funded indebtedness of the carriers remain outstanding.

Relinquishment of Government Control. William G. McAdoo, as Director-General of Railroads, advocated the extension of government operation for a period of years after the end of the War. There was a great deal of political discussion of the question and the question of government ownership was raised. Public sentiment, however, was so obviously against government ownership, which Mr. McAdoo advocated, that he fell back on his proposal for an extension of government operation This did not meet with the approval of Congress and two bills were drawn up: that known as the Cummins Bill in the Senate and the Esch Bill in the House. These two bills were finally consolidated and passed as the "Transportation Act, 1920" which recites that it is "An Act to provide for the termination of Federal control of railroads and systems of transportation; to provide for the settlement of disputes between carriers and their employees; to further amend an Act entitled 'An Act to regulate commerce,' approved Feb 4, 1887, as amended, and for other purposes." The three important changes which the "Transportation Act" made in the act to regulate commerce were: (1) A duty is placed on the Interstate Commerce Commission, in making freight and passenger rates, to make such rates as will allow the railroads as a whole, in one territorial group, to earn a fair return on their valuation as fixed by the Commission; (2) A scheme for voluntary consolidations of the railroads is provided for and this is so closely connected with the fair return provisions of the Act that the two will be discussed together; (3) The Act creates a Railroad Labor Board of nine members, three representing the public, three the railroads and three the railroad employees It was provided that in any disputes regarding wages, the railroad managements would attempt to arrive at a settlement with their own employees, and failing this, either side could bring the dispute before the Railroad Labor Board. It was the duty of the Railroad Labor Board then to make an investigation of the facts and come to a conclu-

sion, making public its findings, but there was no power given the board to enforce its findings through the application of penalties.

Both the railroad employees and the railroad managements have in certain instances refused to follow the findings of the board, but notwithstanding this it is probably the consensus of opinion among railroad managements that the labor board is an improvement over the former method of dealing with railroad employees

The strike of the railway shopmen which took place in 1922 was in defiance of the findings of the Railroad Labor Board. The shopmen, who had been organized and had become affiliated with the American Federation of Labor, during the government operation of the roads, had asked for an increase in wages. The Railroad Labor Board made an investigation of living conditions and wage scales in other lines of industry, and fixed as fair wage a somewhat lower rate than the shopmen had asked for. A strike was called on July 1, 1922, and the question was bitterly fought out The Labor Board issued a public statement in which it said that the strike was in defiance of justice, but it continued to work for the reconciliation between the men and the managements. The strike was peculiarly bitter in the southwestern part of the United States. Here the families of employees who remained loyal to the company were persecuted and innumerable acts of cruelty to men and their families were committed in the name of the striking shopmen.

The Association of Railway Executives carried on negotiations with representatives of the American Federation of Labor and in the meantime the officers actually in charge of the operation of the railroads attempted to replace the striking shopmen and to carry on railroad service Railroad service was actually carried on without any serious interruption although there were delays and the cost to the railroads was extremely heavy. Finally the labor union took the position that if its men should be restored to their seniority rights and the men employed in their places should be discharged or demoted, the strikers would return to their work at the Labor Board wage scale. In many instances the railway executives had given their personal word to the men employed in the place of strikers that they should retain their newly gained seniority rights and continue to hold their jobs The Association of Railway Executives separated into two groups: one group settling with the strikers under the so-called Baltimore plan, by which the strikers were granted, in substance, the demand for reinstatement with restored seniority rights, the other group refusing to settle. The second group included some of the best managed railroads in the United States; for instance, the Union Pacific. Theoretically the strike against these roads continued on through 1922 and 1923 Actually, however, by 1923 the new forces, even on the southwestern roads such as the Missouri Pacific and the St. Louis-Southwestern, had been organized and were functioning smoothly.

The most notable instance of the refusal of railroad management to follow the finding of the Railroad Labor Board was in the case of the Pennsylvania Railroad which formed unions of its own employees, of which only employees were officers. This, of course, excluded the professional labor leader of the American Federation of Labor. The scheme was fought bitterly by the American Federation of Labor and was brought before the Railroad Labor Board, because when the election of men to represent employees before the Board took place on the Pennsylvania, the followers of the American Federation of Labor refused to vote for men who were Pennsylvania Railroad employees On the other hand, the Pennsylvania Railroad management insisted that only employees of the Pennsylvania should represent employees before the Labor Board The Labor Board held that the men had a right to elect American Federation of Labor or other professionl labor leaders to represent them and that the Pennsylvania was wrong. The Pennsylvania management was engaged in 1923 in attempting to get the question before the Supreme Court.

Consolidations. In connection with the provision in the Transportation Act which lays a duty on the Interstate Commerce Commission to fix rates that will yield a fair return, leaving no recourse to the railroads, however, if this duty is not lived up to, and leaving it entirely to the commission to decide what is the fair rate of return, there is also a provision which establishes a revolving fund and provides that any railroad company that earns in excess of 6 per cent on its valuation in any year shall pay into the revolving fund one-half of the excess earnings and retain the other half as a fund to make up deficiencies in following years.

The framers of the Transportation Act of 1921—the Esch-Cummins bill—were acutely aware of the "weak" and "strong" railroad problem, and they made a provision that if one company earned more than 6 per cent on its valuation the excess earnings should be appropriated in part by the government, to be distributed as a loan or otherwise to the companies in the same group that were unable to earn a fair return on the value of their property.

The change of attitude on the part of the government, which that Transportation Act expressed, consisted (1) in a recognition of the principle that capital invested in railroads, taken as a whole, should be permitted to earn a fair rate of interest; and (2) in a recognition of the fact that under the same rates some railroad companies would earn more than a fair interest rate on their investment and others would earn less. It was, further, a recognition of the fact that the so-called "weak" roads must be kept in business; and it laid down the somewhat socialistic doctrine that since railroads were not created equal the government could take from the strong and give to the weak. Apparently there was doubt as to the constitutionality and the sound economics of this doctrine, and an attempt was made to attain the same end by providing for the consolidation, under one company, of weak and strong roads.

"The commission shall as soon as practicable prepare and adopt a plan for the consolidation of the railway companies of the continental United States into a limited number of systems" The Transportation Act goes on to explain that in making plans for consolidations, the Interstate Commerce Commission shall preserve competition as fully as possible and disturb existing routes of trade as little as possible. The commission is not given power to force consolidations but has the power to prevent consolida-

tions which are not in accordance with its plans.

The commission employed Prof. William Z. Ripley to formulate a tentative plan of consolidation, and he divided the railroads of the United States into 21 systems. For rate-making purposes the commission had already divided the United States into four sections, and Professor Ripley arranged the roads in systems so as to keep each system wholly within a rate group.

The Ripley plan put the railroads lying in the trunk-line territory (eastern rate group) into five systems, each having a through line from New York to Chicago. Thus the Pennsylvania system utilized the through line of the Pennsylvania and its affiliated companies; the New York Central system utilized the New York Central through line; the Baltimore & Ohio-Reading system made use of the Baltimore and Ohio line from Philadelphia and Baltimore to Chicago and added to it the Philadelphia and Reading and the Central of New Jersey—giving it a line into New York; the Erie and Lehigh Valley-Wabash system used the Erie through line between New York and Chicago; and the Lackawanna-Nickel Plate system combined the Delaware, Lackawanna and Western line from New York to Buffalo and the New York, Chicago and St. Louis line from Buffalo to Chicago.

The grouping of the railroads for rate-making purposes recognizes that the roads in New England and the roads in the Michigan peninsula each has characteristics as to traffic, etc., peculiar to itself. Professor Ripley therefore made one railroad system out of the New England roads and one system out of the roads in the Michigan peninsula.

The roads that run between the coal fields of West Virginia and tidewater on the east and middle-western cities on the west have both operating and traffic conditions which are peculiar to themselves. These roads Professor Ripley combined into two systems: one the Chesapeake and Ohio and the other a combination of the Norfolk and Western and the Virginian Railway.

It will be noted that Professor Ripley preserved ample competition in suggesting five trunk-line systems, and adequate competition in suggesting two soft-coal systems; but he made no provision for competition in the New England system or the Michigan peninsular system.

The southeastern rate-group region roads were parceled out among five systems under the Ripley plan, two of these corresponding quite exactly with the present affiliation of roads. The Southern Railway system was left almost intact, and the Atlantic Coast Line-Louisville and Nashville system is the same as the present grouping of roads under the control of H. H. Walters and his associates.

The third system was a consolidation of various roads with the Illinois Central, the fourth system a consolidation of various roads with the Seaboard Air Line, and the fifth a consolidation of a few roads with the Florida East Coast Railway.

The Ripley plan consolidated the roads west and southwest of Chicago into seven systems, five of which he grouped together as a western-transcontinental region and two as a southwestern Gulf region. The systems in the western transcontinental region consisted of consolidations based on (1) Union Pacific, (2) the Chicago, Burlington and Quincy-Northern Pacific, (3) the Chicago, Milwaukee and St. Paul-Great Northern, (4) the Chicago, Rock Island and Pacific-Southern Pacific, and (5) the Atchison, Topeka and Santa Fé. The two systems in the southwestern Gulf region were founded on the St. Louis and San Francisco and on the Missouri Pacific.

The most important contribution from railroad officers themselves toward a consolidated plan was that of Hale Holden, president of the Chicago, Burlington and Quincy, which divided all of the roads west of Chicago and New Orleans into four systems, giving each system two routes from the eastern base line to the Pacific Coast, giving each system lines to Minneapolis and St. Paul and giving each system lines into the southwest.

The year 1924 saw the beginning of what apparently was a restoration of railroad credit and saw the railroads themselves in better physical condition than at any time since 1914. See RAPID TRANSIT.

RAILWAYS, ELECTRIC. See ELECTRIC RAILWAYS

RAISA, ROSA (1893–). A Russian dramatic soprano, born at Bielostok. To escape the horrors of the Jewish persecutions her parents fled (1907) to Naples, where she received her musical education at the Conservatory under Barbara Marchisio. She made her début at Parma (Sept 6, 1913) in Verdi's *Oberto, Conte di San Bonifacio,* during the Verdi centenary celebration under Campanini, the director of the Chicago Opera Association. Campanini engaged her the next year for Chicago, where she remained as one of the principal stars and a prime favorite. She has also appeared with brilliant success in London, Rome, Buenos Aires, Montevideo, Rio de Janeiro, São Paulo, and New York. Toscanini chose her to create the rôle of Asteria in the world première of Boito's *Nerone* (Milan, May 1, 1924) In 1920 she married the operatic baritone Giacomo Rimini.

RAISULI, ACHMED BEN MOHAMMED (1875–). A Moroccan bandit and political leader (see VOL. XIX). Instigated by Germany, he raised a revolt against the French government in Morocco in 1918 and continued active until 1923, when he surrendered to the French. He was also a leader in the Riff rebellion against Spain in Spanish Morocco. See MOROCCO.

RAND, HERBERT WILBUR (1872–). An American zoölogist, born at Oil City, Pa, and educated at Allegheny College and Harvard University. He was assistant principal of the high school at Oil City (1894–96), and at Harvard he was instructor in zoölogy (1900–09), assistant professor (1909–19), and associate professor (1919–). He published articles mainly on regeneration in animals, especially the earthworm.

RANDOLPH-MACON WOMAN'S COLLEGE. An institution for women at Lynchburg, Va., under the auspices of the Methodist Church, founded in 1893. The number of students registered increased from 610 in 1914 to 767 in 1924, the faculty was increased from 47 to 53 members, and the library from 12,500 to 22,965 volumes. The total yearly income was increased from $183,227 in 1914 to $348,167 in 1922–23, and the endowment from $376,500 to $465,049. A Phi Beta Kappa chapter was installed in 1916, the Latin requirements for entrance were changed from four to three units, and nine hours' credits allowed for music. For

the degree, a grade of 85 in half the courses was required. Four buildings were erected, the Smith Memorial Student Building, Webb Dormitory, the president's home, and the observatory. A campaign was being carried on in 1923–24 for $1,250,000, of which all but $125,000 had been raised by January, 1924. President, Dice Robins Anderson, Ph.D.

RANGE. See ARTILLERY.

RANKIN, JEANNETTE (1880–). An American public official, born in Missoula, Mont., and educated at the University of Montana and the School of Philanthropy in New York City. She engaged in social work in Seattle and took an active part in woman suffrage work, she was field secretary of the National American Woman Suffrage Association. In 1917 she was elected to Congress as Representative-at-large from Montana and was the first woman ever seated in that body She was defeated for reelection in 1920.

RANSOME, FREDERICK LESLIE (1868–). An American geologist, born at Greenwich, England, and educated at the University of California. He was assistant in mineralogy and petrography at Harvard and entered the service of the United States Geological Survey where in 1900 he became geologist in charge of various sections of western areal geology (1912–16) and later of metalliferous deposits. He also lectured on ore deposits at Chicago in 1907 and was Silliman lecturer at Yale in 1913. During the War Dr. Ransome was connected with the National Research Council and became its treasurer in 1919. In addition to being an associate editor of *Economic Geology*, he is the author of many official monographs on the geology of western mining districts and papers in scientific journals.

RAPALLO, TREATY OF. See FIUME-ADRIATIC CONTROVERSY, PEACE CONFERENCE AND TREATIES.

RAPID TRANSIT. Notwithstanding the War and the unsettled condition of the various countries in the decade between 1914 and 1924, there was no single question that aroused more general interest in and about large cities than the provision of adequate urban and suburban transit facilities This was due in large measure to the phenomenal growth of the large cities particularly in the new countries, and the concentration of activities and industries in certain districts at a distance from available housing facilities

The problem was not entirely one of new or additional subways; there were cities where elevated railways were constructed in the period under consideration, and also cities where important readjustments and at times relocations of surface traffic were demanded so as to relieve in a measure the congestion which prevented the proper handling of the traffic especially at the times of peak load and when the streets were thronged with vehicular and pedestrian traffic.

The troubles were not only of construction. Between 1914 and 1924 costs of operation, due particularly to increased cost of materials and labor mounted so that in many American lines what was considered the standard fare of five cents became inadequate to meet even operating costs while in some parts of the United States the operation of interurban or suburban lines was no longer possible due to the competition of motor vehicles both public and private. In New York City in 1919 the New York City Railways and the Brooklyn Rapid Transit Company went into the hands of a receiver while the Interborough Rapid Transit Company later was saved only by careful financing.

So serious was this situation in the United States that in 1920 when the report of a Federal Electric Railway Commission, appointed by President Wilson, May 31, 1919, was issued, it was frankly stated that the electric railway industry was without financial credit and was not properly performing its public function. The reason for this was given as early financial mismanagement, various economic causes accentuated by high price levels of labor and materials, and the failure of the five cent fare to provide revenues adequate to meet operating costs, maintenance, and necessary extensions. See ELECTRIC RAILWAYS.

Throughout the United States there was a movement towards government operation and ownership, which often was revealed in oppressive measures of regulation that interfered with the efficient and profitable conduct of the various utilities. See MUNICIPAL OWNERSHIP.

New York City Subways. The 10 years 1914–24 witnessed important developments in New York, but also a disintegration of the existing system of surface lines and a failure of the municipal authorities to develop plans for additional much needed lines and to provide means to carry them into effect The so-called Steinway Tube under the East River from 42nd Street, Manhattan, to Long Island City was opened in 1915 as a part of the Interborough Rapid Transit system. The dual subway system was further developed and the various lines of the New York Municipal Railways including the Broadway subway were opened in 1917 and 1918 and were extended from time to time but the complete development of the dual system along the lines originally laid out was impossible on account of the hostility of the New York Municipal government which was favorably disposed toward city owned and operated transit facilities and absolutely opposed to any increase of fare over the time-honored five cents.

The carrying capacity of the elevated railways was extended by the building of third tracks over which express trains were run to take care of the heavy traffic at morning and night. In 1924, New York City had in operation over 600 miles of subway and elevated tracks of which the Interborough operated 361 miles and the Brooklyn-Manhattan Transit Corporation, a successor to the New York Municipal Railroad, 258 miles. Of the Interborough's lines, 222 miles were subway and 139 miles elevated railway.

The immensity of the transit problem in New York City is shown by the fact that the Interborough Rapid Transit in the year ended June 30, 1924, carried 1,074,343,243 passengers. Such traffic was handled under conditions of crowding and congestion and the same was true for the Brooklyn-Manhattan Transit Lines. There was an urgent need of additional subways and connections for which various plans had been prepared.

Boston. The Boston Transit Commission ceased to exist on June 30, 1918, after 24 years of existence during which it had developed a comprehensive traction system for that city and had supplied all of the facilities called for, or rather all that means were available for constructing. After the elevated railways had been constructed and the subway from Tremont

Street to Cambridge, the next section, the Boylston Street subway, running through the Back Bay District to the junction of Commonwealth Avenue and Beacon Street, was opened on Oct. 3, 1914. Following this came the section to Andrew Square, Dorchester, which was opened in 1916. In addition, there were completed the Washington Street and East Boston subways so that Boston had a well unified system of subways. Operation of the Boston Elevated Road passed into the control of a Board of Trustees on July 1, 1918, and to meet deficiencies in revenue the fare was raised from five to seven cents on August 1, and later in the year to 8 cents. Even this was insufficient to meet operating costs, as was a 10-cent fare adopted later

Philadelphia. Rapid transit development was an important feature in Philadelphia between 1914 and 1924 An existing subway ran east and west under Market Street, terminating in a short north and south elevated line along the river front, and on Apr. 26, 1915, the city voted a bond issue to provide for the construction of a subway which would cross under the older one at the City Hall and extend north and south under Broad Street. There was also involved an elevated line to Frankford which was completed in 1919 The next elevated line to be built was the Woodland Avenue section of the Darby route The construction referred to as gradually completed, however, did not meet the requirements and in 1923 a general and comprehensive plan was under consideration of which various extensions of the subway routes and elevated lines were decided on.

Chicago. The City of Chicago, with its surface and elevated railways, experienced a congestion of traffic no less than other American cities but in the decade under review little had been done beyond the preparation of plans and discussion.

Detroit. In 1923, the City of Detroit was so near its debt limit that little could be done in the way of bond issues for providing funds for developing increased transit facilities or improving then existing conditions.

Cincinnati. In 1915, plans for an extensive rapid transit system involving a belt line surrounding the city were adopted, and in the following year a bond issue for this purpose was authorized The execution of the project was postponed on account of the war until 1921, when the subway portion was put under active construction using for part of the route the abandoned Miami and Erie Canal, thus decreasing construction costs materially The loop as planned was about 16.45 miles in length and consisted of 2 45 miles of subways; 9 miles in the open cut with bridges or subways at intersecting streets; 0.2 miles of tunnel; 3.4 miles of concrete trestle, and 1 4 miles of concrete elevated structure. The line begins at Fountain Square and extends north in subway in Walnut Street, where it joins the canal and thence west in subway to Plum Street, where the line turns north in subway to Brighton whence a circuit is made returning to the starting-point Another important development in Cincinnati was the construction of a large double-decked terminal for interurban electric cars which served also as an annex to a large office building This terminal was connected by a viaduct with the Covington Bridge over the Ohio River. There was also accommodation here for the Newport cars which crossed on the Newport or Central Bridge and running on the surface entered the first floor of the terminal.

San Francisco. See SAN FRANCISCO.

St. Louis. With the development of its suburbs and the congested condition of traffic in its business district, the city of St. Louis was forced to take under consideration some plan in which the street railways would be extended and rerouted and conditions relieved as by the construction of a subway loop. The City Plan Commission, the Department of Public Utilities, and other organizations were considering this problem in its many bearings but no actual construction work was started up to 1924.

London. At the time of the outbreak of the War in 1914, the various city and suburban railway lines in and about London were engaged in various improvements and extensions. The suburban lines such as that of the London and Northwestern from Euston to Harrow were electrified, and the electrification of the line between Hammersmith and Earls Court of the District Railway Company vastly increased the daily number of trains The general plan was to tie in as far as possible the suburban lines with the urban tubes and to adopt electrification as rapidly as possible Naturally the War interfered with the immediate execution of many of the projects planned, but with the return of peace such plans were set on foot as the connection of the Central London line with the suburban system of the London and Southwestern Railway so as to afford an alternative route from the Hammersmith district into the city and to extend it as far as the suburban district of Ealing. The most notable improvement, perhaps, was the reconstruction of the City and South London line, the first and smallest of the many tubes which had been built in London This tunnel was increased to standard dimensions so that its traffic could be exchanged with the Hampstead line and provide for through traffic between the northern and southern districts of London. The scheme of extension undertaken also involved a connection between the City and South London Railway and the Charing Cross, Euston and Hampstead Railway extending from Euston to Mornington Crescent, and the extension of the Hampstead Railway from Golders Green to Edgeware In addition to the important passenger routes, an electrically operated underground rapid transit mail railway was built to connect the chief post offices and trunk line dépôts in the London district. The tubes have an inside diameter of 9 feet and contain a track of 2-foot gauge over which trains of motor cars are operated by a remote-control system.

Barcelona. In 1924, there was under construction in Barcelona, the commercial capital of Spain, a subway system which was designed to connect the surface railways entering the city from the east and west This work was intended to be completed in 1925, but on Apr. 12, 1924, there was a temporary setback when a portion of the vault in the centre of the mediæval city fell, causing a large breach in the street and the footways above. This accident caused the death of five laborers who were working underground, and injured 25; of the surface crew, 13 were injured

Madrid. In 1919, the City of Madrid had completed and put into operation the first 3 miles of its subway system extending from the

northern part of the city to Puerta del Sol, the centre of the business district. This was followed by construction carrying the line to the station of the eastern and southern railways.

Sydney, Australia. An interesting transit scheme was being developed for Sydney, New South Wales, which involved both underground and elevated lines and a combination of new urban facilities with those of existing routes. The urban and suburban railways were being electrified and extended into and around the city so as to form a city loop, from which railways were to lead to the western and eastern suburbs served by a street railway service system. This new work was being undertaken in connection with the electrification of the suburban steam railways terminating at the Central Railway Station on the city side of the harbor, and at Milson's Point. From there passengers would be brought into the city and distributed over four underground and two open-air stations on the city loop. See TUNNELS; BRIDGES.

RASMUSSEN, KNUD (JOHAN VICTOR) (1875–). A Danish Arctic explorer (see VOL. XIX). His voyages in Polar regions and acquaintance with the Eskimos furnished material for some unusually interesting books which include: *Liv i Gronland* (1915); *En Gronlands Drom* (1915); *Min Rejsedagbog* (1915); *Sermerssnakut Tunnliarnilerssomtit* (1910); *Nye Mannesker* (1919); *Gronland Langs Polhavet* (1921); and *Myter og Sagn fra Gronland* (1921), which in the English translation is called *Eskimo Folktales* (1921). Another work which appeared in English is *In the Home of the Polar Eskimos* (1923).

RASPUTIN, GREGORY. See RUSSIA, *History.*

RATHENAU, WALTER (1867–1922). A German political economist and statesman, born in Berlin, Sept. 29, 1867, and educated in the German technical schools. In 1899 he established the first factory for electrochemical specialties in Germany. He rose rapidly as an industrial organizer and leader and became in 1915 president of the all-powerful Allgemeine Electrische Gesellschaft. During the years 1908 and 1909 he served as an economic representative of the German government in the East African colonies. When the War broke out, he was in charge of official organization of the food supply but did not remain in office more than a year. After the German revolution, having identified himself with the radical parties, Rathenau was appointed Foreign Minister (1921). He went to the Genoa Conference with a policy of conciliation between Germany and the Allies. Although he negotiated a treaty of friendship with the Russian Soviet government (the Treaty of Rapallo), his Genoa mission did not accomplish its purpose. In June, 1922, he was assassinated at the instigation of reactionary groups, who could not forgive either his radical policy or his Jewish ancestry.

Rathenau was one of the few German leaders who combined a remarkable ability at industrial organization with philosophic grasp of the cultural needs of modern societies. His writings range from speculative philosophy of the type called professional to the problems of industrial efficiency, and they pass by the highly treacherous shoals of social and economic policy. His *Von Kommenden Dingen* (1918) and *Was Wird Werden,* translated as *In Days to Come* (1921), combine prophetic vision with a scientific understanding of sociological intricacies. His other works include three volumes of *Gesammelte Schriften* (1918); *Nach der Flut* (1919); *Die Neue Gesellschaft* (1919; English translation, *The New Society,* 1921); *Autonome Wirtschaft* (1919); *Der Kaiser* (1919); and *Der Neue Staat* (1922).

RAVEL, MAURICE (1875–). A French composer, born at Ciboure, Basses-Pyrénées. He received his musical training at the Paris Conservatoire under C. de Bériot (piano), A. Gédalge (counterpoint and fugue), and G. Fauré (composition). In 1901 he won the second Prix de Rome with a cantata, *Myrrha.* He never held any official positions but lived in Paris and devoted his entire time to composition. In 1920 he was made Chevalier of the Legion of Honor. As a composer he is one of the most prominent of the impressionists, second perhaps only to Debussy. While he does not shrink from daring harmonies, unresolved dissonances, and complicated rhythms, his themes are more pregnant and definite than those of most impressionists. His talent appears to best advantage in the finely wrought details of works in the smaller forms, especially in the compositions for piano. He wrote the operas, *L'Heure Espagnole* (Paris, 1911; Chicago, 1920) and *La Cloche Engloutie* (not yet produced); the ballets, *Daphnis et Chloë, La Mère l'Oye,* and *Adelaide ou le Langage des Fleurs* (all in Paris, 1912); an overture, *Shéhérazade; Rapsodie Espagnole;* a choregraphic poem, *La Valse;* a piano concerto on Basque themes; *Trois Poèmes* (Mallarmé) for voice, piano, two flutes, two clarinets, and string quartet; *Shéhérazade* for solo voice and orchestra; some chamber music; songs; and piano pieces, among which the *Valses Nobles et Sentimentales* are particularly fine.

RAWLINSON, HENRY SEYMOUR, first BARON (1864–1925). In 1917, at the outbreak of the War, he commanded the famous but ill-fated 7th Division in Belgium in pursuance of the scheme for holding back the Germans on the line of the Scheldt River. With the exception of a short time as a member of the Allied War Council, he remained in high command during the entire war. His chief exploit was in the great British offensive of 1918, when, with the 4th Army, he drove the Germans over the Hindenburg line and was thus instrumental in bringing about the collapse of their defense. He was raised to the peerage in 1919.

RAY, CHARLES (1891–). An American actor, born in Jacksonville, Ill. best known for his work in motion pictures. He began his career on the legitimate stage in small parts in stock and vaudeville. His first film was a Thomas Ince production. *The Coward, The Deserter, The Dividend, The Pinch Hitter,* and *The Clodhopper* were his best starring pieces up to 1920, when he incorporated his own company and produced George Cohan's *Forty-five Minutes From Broadway,* James Whitcomb Riley's *The Old Swimmin' Hole,* Charles Van Loan's *Scrap Iron,* Charles Hoyt's *A Midnight Bell,* and others.

RAY, GEORGE JOSEPH (1876–). An American civil engineer, born at Metamora, Ill., and educated at the University of Illinois. He entered the service of the Illinois Central Railroad as a roadman. By regular advancements he attained the place of division engineer, which he held until 1909, when he became chief en-

gineer of the Delaware, Lackawanna, and Western Railroad. His chief work for this railroad was the construction of the Hopatcong-Slateford cut-off; he also designed and built the Tunkhannock viaduct at Nicholson, Pa., the largest concrete bridge ever constructed up to that time. During the War he was engineering assistant to the regional director of the Eastern Region of the United States Railroad Administration but in 1920 returned to his former position.

REA, SAMUEL (1855–). American engineer and railroad president (see VOL. XIX). In 1917 the American Railway Association appointed him a member of the special commission on national defense of the Railroads War Board. He was also director of railroads under the authority of the Committee of Public Safety of Pennsylvania. He gave his yacht to the United States government for patrol duty in the Atlantic during the War.

READING. A city of Pennsylvania. The population rose from 96,071 in 1910 to 107,784 in 1920 and to 110,917 by estimate of the Bureau of the Census for 1923. Concrete viaducts were built over the Schuylkill River and the Pennsylvania Railroad tracks at Penn Street, and at Schuylkill Avenue and River Road, and a concrete bridge over the river at Bingaman Street. A city planning commission was appointed. Five million dollars was voted for a school building programme, and two junior high schools were built at a cost of $1,500,000. Additions were made to two hospitals and a third was being built, a Y. W. C. A. building was completed in 1921, and plans were ready for the erection of a museum and art gallery. The electric, gas, city water, sewer, and trolley systems were extended. The number of industrial establishments increased from 486 in 1914 with output valued at $53,232,000, to 501 in 1924 with output valued at $169,630,422.

READING, (RUFUS ISAACS), first EARL OF (1860–). An English jurist (see VOL. XIX), appointed in 1913 Lord Chief Justice of England. His knowledge of finance was of great service during the War, and he was sent to the United States on special missions, including those of High Commissioner and Special Ambassador. In 1920 he was appointed Viceroy of India.

RECLAMATION, LAND. Reclamation of land for agricultural use offers larger opportunity for increasing food production than any other single operation, since throughout the world there are large areas that can be made productive by some one of the processes embraced by this term.

World-wide figures for the areas susceptible of reclamation are not available. The *Year-Book of the United States Department of Agriculture* for 1921 gives the area of arid land susceptible of reclamation as 30,000,000 acres, and the area of wet land susceptible of drainage as 90,000,000, making a total of 120,000,000 acres, or an area equaling about 25 per cent of the area of improved land in the United States, or about 33 per cent of the present crop area in the United States To this can be added a considerable but not definitely known area of land now subject to overflow but capable of reclamation by dyking. Probably it is safe to say that the crop production of the United States can be increased at least one-third by land reclamation. In the absence of definite information, it seems probable that the same estimate may be applied safely to the world as a whole. For the United States, the Census of 1920 shows the area actually irrigated in 1919 to be 19,191,716 acres; the area in existing irrigation enterprises 35,890,811 acres; and the area drained in 1920 65,495,038 acres, of which 44,288,238 acres were reported as "improved" land according to the Census definition.

The United States, about 1850, granted the swamp lands then belonging to the Federal government to the States in which they were situated, in order that the States might provide for their reclamation. As a consequence the Federal government has not participated in swamp-land reclamation, otherwise than by this grant of land. In the case of irrigation reclamation, the United States government has helped to promote development, first by removing so far as possible the obstacles to development by non-governmental agencies, and later by government financing and construction. In 1902 the Reclamation Law was enacted. This set aside the receipts from the sale of public lands as a reclamation fund to be used in the construction of irrigation works, repaid by the water users, replaced in the fund, and used again. As reported by the Census of 1920, the acreage irrigated in 1919 by works built under this law was 1,254,569 acres, or about 6.5 per cent of the total area irrigated in that year. The amount expended under the law at that time was reported as $129,509,819, which is 18.6 per cent of the total investment in irrigation for the United States. Interest is not charged on deferred payments, but if added would make the actual cost to the government greater than that reported, the remission of interest being, in effect, a subsidy to land reclamation. Only a small part of the money invested in this work by the government has been repaid, but the receipts from other sources have been added to the reclamation fund, so that the amount available for the year 1923 was about $10,000,000. The failure of water users to repay construction costs led to the appointment of a commission to investigate and recommend changes in the law or its administration (1923–24). It was felt that the relations between the government and the water users should be governed by contracts that can and will be carried out, rather than continue under nominal obligations that are ignored Dr. Elwood Mead of California was appointed Commissioner of Reclamation early in 1924.

Drainage reclamation in the United States has taken place almost entirely under State laws for the creation of special improvement districts that have the power to issue bonds to obtain funds for construction, and to levy and collect assessments to meet payments of principal and interest on bonds and operating expenses. These districts are organized under public supervision, but otherwise receive no public aid. The States containing arid land have enacted similar laws for the organization of irrigation districts, and have, in most cases, attempted to aid in the sale of bonds by certifying such bonds as legal investments for public and trust funds, but they have not assumed any legal liability for the payment of bonds or interest, except in the case of Oregon, where the State pays the interest on the bonds of approved districts for periods of from two to five years. There have been many proposals for extending to drainage reclamation the system of Federal aid in irrigation. Several bills providing for

this were introduced in Congress, but up to 1924 none had been passed. On the other hand, there was a growing objection to further subsidy to land reclamation.

For many years in the United States the rate of expansion in the area of reclaimed land used for agriculture has been decreasing. The average annual increase in the area irrigated from 1900–10 was about 669,000 acres; while the average annual increase from 1910 to 1920 was but 476,000. Annual figures are available for the government projects only. On these the rate of increase had been falling off sharply, even during the boom years of the War, and the year 1922 showed an actual decrease in acreage as compared with 1921. The decreasing rate of expansion was due, to a large extent, to increased cost of water supply. The Census of 1890 showed an average cost of $7.95 per acre; that of 1900, $9.04; that of 1910, $15.85; and that of 1920, $26.81. These figures do not represent correctly the increase in cost; this is shown by averages based on increased total cost and increased total area, from one census to another. Averages based on such figures are as follows: 1890, $7.95; 1900, $10.05; 1910, $20.05; 1920, $65.60. Comparing these costs with that of 1890, the percentages of increase are 1900, 26.4 per cent; 1910, 152.2; 1920, 725.2. In the future, construction will be increasingly difficult and increasingly costly except for general changes in price levels.

Increased food supplies can be obtained in several ways other than by reclaiming lands largely unproductive. This increasing cost of reclamation will tend to force expansion into other lines. Nevertheless, the possibility of expansion by reclamation exists, and such expansion will take place as the pressure of population on food supply becomes more intense. In the United States the policy was to make reclamation self-supporting, except for the subsidy represented by relief from interest on deferred payments. Other countries very generally considered reclamation of sufficient importance to justify considerable public subsidies. Italy had provision for the payment of a part of the cost by the national government, a part by the provinces, a part by those who were to use the water. The British government, in India and Egypt, built and operated reclamation works without provision for direct repayment of cost, but secured its return through taxation of the products grown. In some cases it was expected that the taxes would pay interest on the cost, such projects being classed as "productive"; while in other cases such a return is not expected, and the projects are classed as "protective," or "famine" works. In either case, the water users were not under contract to pay any set amount for their water supply, but were to pay according to the products grown. In Australia, however, the state governments have carried on reclamation on the plan adopted in the United States, where the land reclaimed is expected to make a direct repayment of the cost, in addition to being subject to the same taxes as other farm land. Generally, this plan of financing has not been successful, and investors in reclamation enterprises operating on this basis, whether they were public or private, have lost heavily, while the eventual water users have acquired a water supply at less than cost.

RECLAMATION BUREAU, UNITED STATES. See DAMS.

RED CROSS, AMERICAN NATIONAL. The decade 1914–24 was the most important in the history of this volunteer reserve emergency organization, whose object was to relieve distress in times of peace and war. The most important functions were naturally those relating to war relief. At the outbreak of the War, the Red Cross had a registered enrollment of 5500 nurses and the necessary surgeons, besides an equipment for the purchase and transportation of supplies. This enabled it, during the latter part of 1914 and through 1915, to send to Europe surgical and sanitary units, each comprising three surgeons and 12 nurses, together with the necessary supplies, for war hospital work and the relief of noncombatants; it thus rendered greater continuous service than was ever given in a foreign war by any Red Cross of a neutral country. In addition to its services in the War, the Red Cross extended relief in 1915 to sufferers in Mexico, in Colon, Panama, and in Haiti. Relief was also furnished to sufferers from floods in Texas and Arkansas and from other emergencies in the United States. In 1916 the Red Cross remained devoted to European war relief, to some extent military, but chiefly civil. For this purpose it received during the year about $700,000. Important relief work was carried on in Serbia, Lithuania, Armenia, and Syria. The department of military relief in this year did most efficient service in the establishment of base hospitals and in rescuing wounded combatants. Important progress was made during the year in the organization of Red Cross units from the staffs of physicians and nurses in civil hospitals; 21 base hospitals were created for the United States Army, and four others were authorized. There was created on June 1, 1916, a national committee on Red Cross medical service, composed of 47 distinguished American physicians and surgeons. With the entrance of the United States into the War, increased concentration was required of all the forces of administration and relief; and the entire work was placed on a war basis. A central committee was formed in 1917, with William Howard Taft as chairman. Many important changes resulted. The most important of these was the appointment of a War Council of the Red Cross by President Wilson. Of this, Henry P. Davison, of J. P. Morgan and Company, was chairman. The result of the reorganization was to broaden the scope of the American National Red Cross so as to include the United States and the Allies. Work was from that time carried on in two important divisions: the service in America and that in Europe. Immediately after the organization of this council, a campaign was undertaken to raise $100,000,000 for the use of the organization. More than this amount was soon pledged. For relief work in foreign countries about $50,000,000 was appropriated; for work in the United States, about $3,000,000. The membership, which was about 5,000,000 at the beginning of 1917, increased to approximately 22,000,000 at the end of the year. By 1918 the work of the Red Cross had reached a high point of efficiency. In the United States, canteens and rest stations were established and maintained at 700 railroad and embarkation points, at a cost of nearly $8,000,000. Sanitary conditions around the camps were improved, and emergency supply hospitals were provided. Fifty base hospitals were organized, of which 49 were

sent to Europe; 45 ambulance companies, with 124 men each, were turned over to the army; over 32,000 nurses were enrolled, of whom over 20,000 were assigned to war duty with the army and navy; 10,000 were sent overseas. Sixty-three homes for convalescent soldiers were provided. During the year nearly $40,000,000 was spent in France alone, of which $15,000,000 was spent for relief of soldiers, and the remainder for civilian relief. Eight hospitals for American soldiers only were built, equipped, and operated, besides many others equipped and operated for French civilians. Hospitals were also built and maintained in England, Belgium, and Italy. In Serbia, 50,000 destitute persons were supplied with food, clothing, and medical supplies. The Red Cross was obliged to leave Russia when the Bolshevists obtained control. Much work was done by the Rumanian Commission following the defeat of the Rumanian Army in 1918. Nearly $4,000,000 was contributed to the American committee for Armenian and Syrian relief, and a commission was sent to Palestine with four medical units. Arrangements were made for the equipment of a hospital in that country. In addition to its war work, the Red Cross continued to give regular disaster relief work in the United States, China, Guatemala, and elsewhere.

With the conclusion of the War, great readjustments were necessary in the administration of the society. Various foreign commissions were successively closed out, and in May, 1919, a committee of liquidation began to make reducing readjustments, to sell off supplies no longer needed in relief operations. Late in 1919 there were still 1100 Red Cross workers in Europe. A programme formulated for work in the United States contemplated the establishment of health stations in communities without adequate facilities. The report of the War Council made in 1919 disclosed the following record of its activities. The contributions received in material and money amounted to $400,000,000; its members, including adults and children, 31,000,000; Red Cross workers, 8,100,000; tons of relief supplies shipped overseas, 101,000; foreign countries in which the Red Cross operated, 25; French hospitals given material aid, 3780; refugees aided in France, 1,726,000. There remained at the beginning of 1919 a balance of $127,000,000, of which $41,000,000 was in cash and $53,000,000 in supplies. Relief work continued to be carried on during the year in Albania, Belgium, Czecho-Slovakia, Germany, Italy, North Russia, Poland, Rumania, Serbia, and Siberia. The Red Cross took a leading part in the formation of the League of Red Cross Societies, which with headquarters at Geneva and with the National Red Cross organizations of the United States, Great Britain, France, Italy, and Japan as founder members, began in 1919 a world-wide fight for the prevention of disease and the promotion of health. The work of the Red Cross in 1920 was devoted chiefly to two major undertakings, the complete fulfillment of its obligations to the veterans of American participation in the Great War and to their families, and to completion, as far as possible, of relief work among the war-exhausted peoples overseas. To the men still in the army the organization continued to furnish recreation and assistance. At the end of the fiscal year, 1920, there were 7,000,000 instances in which help had been extended to men or to their families involving the expenditure of $20,000,000. Foreign relief work was carried on during 1920 in practically all the countries in which it operated in 1919, but by the end of the year, operations were confined to Poland, Serbia, Montenegro, Albania, Turkey, and southern Russia. Its most extensive work was carried on in Poland, where it did efficient work in the fight against typhus. In western Europe and the Baltic states, the distress of over 300,000 civilian poor was relieved. During the year the total expenditure for relief was about $70,000,000. During 1921 there was a marked expansion in peace-time activities at home and a contraction in foreign fields. There was a reduction of the operating divisions from 14 to 9. Extensive and varied assistance was given to American veterans of the War There was increased activity in public health and nursing service, and effective disaster relief was furnished at home and abroad. In foreign countries, there was a concentration of effort on child welfare work, chiefly medical in character. During the year about $25,000,000 was expended. Foreign relief work was carried on in Austria, South Russia, Constantinople, Poland, Italy, Greece, and other countries. In China, the Red Cross spent $1,200,000 for relief of famine sufferers, and it was estimated that more than 600,000 people were thus saved from starvation. In the United States, service was rendered to more than 25,000 disabled war veterans. In 1922 about $12,500,000 was expended. Of this, approximately $2,600,000 was for assistance to disabled ex-service men and women; $1,200,000 for medical and hospital supplies for distribution by the American Relief Administration in Russia; $2,000,000 for the completion of the child health programme in Europe, and $2,000,000 for the completion and liquidation of general relief operations abroad. During the year assistance was given in 72 disasters, including floods, fires, epidemics, and railway collisions. Work was carried on in seven foreign countries. The outstanding emergency operation of 1923 was the relief work for nearly 900,000 refugees in Greece, comprising those who had been driven out of Asia Minor. This work was closed on June 30, 1923. The total amount expended was over $2,500,000. The Red Cross took a most important part in contributing relief to the Japanese earthquake sufferers, in September, 1923. Within two weeks, over $5,000,000 was contributed, and 10 shiploads of supplies were forwarded to Japan. Foreign operations included also work for Russian refugees in and around Constantinople and refugees from Siberia, continued aid to the American Relief Administration to Russia, and aid to earthquake sufferers in Chile and Persia. Work for ex-service men continued on a large scale during the year The total expenditures for the fiscal year amounted tc $9,738,448. Special attention was given in 1923 to work in widely scattered rural communities. The American Junior Red Cross, composed chiefly of pupils in schools, brought in nearly 5,000,000 members in 1923. The membership of the adult organization was approximately 3,600,000. Following the death of President Harding, President Coolidge was elected president of the organization.

REDFIELD, Edward Willis (1869–). An American painter (see Vol. XIX). He won the gold medal of the Carnegie Institute in 1914, was on the jury of awards of the Panama-

Pacific Exposition in 1915, and won the first prize of the Wilmington (Del.) Society of Fine Arts in 1916, the Carnegie prize from the National Academy of Design in 1918 and 1922, the Altman prize from the National Academy of Design in 1919, and the Stotesbury prize from the Pennsylvania Academy of Fine Arts in 1920. One of his latest pictures, "Sycamore Hill," was in Carnegie Institute.

REED, JAMES A. (1861–). An American legislator (see VOL. XIX), United States Senator from Missouri. He was first elected for the term beginning Mar. 4, 1911, and was re-elected in 1916 and again in 1922. He opposed in the Senate many of President Wilson's policies, including the League of Nations and the Versailles Treaty, and Wilson in effect repudiated him as a member of the party. He was a candidate for the Democratic nomination for the presidency in the early part of 1924 but withdrew following his defeat in the Missouri primaries in March.

REED COLLEGE. A coeducational institution of higher learning at Portland, Ore., founded in 1911. The enrollment increased from 280 in 1916 to 321 in 1923, the faculty during the same period from 21 to 32 members and the library from 12,000 to 25,834 volumes. Various changes were made in the requirements for admission, and the curriculum of the freshman and sophomore years was reorganized in 1921. The Anna Mann cottage for women was built in 1920 and the Commons-Union was completed in 1923. William Trufant Foster resigned from the presidency in 1919, and was succeeded by Richard Frederick Scholz.

REESE, ALBERT MOORE (1872–). An American zoölogist, born at Lake Roland, Md., and educated at the Johns Hopkins University. He was professor of biology at Allegheny College (1901–02); instructor (1902–03) and associate professor (1903–07) at Syracuse University; and professor of zoölogy (1907–) at the University of West Virginia. He published numerous papers on the habits and embryology of the American alligator and *Introduction to Vertebrate Embryology* (1910), *The Alligator and its Allies* (1915), *Outline of Economic Zoölogy* (1919), and *Wanderings in the Orient* (1919).

REEVES, IRA LOUIS (1872–). An American educator, born at Jefferson City, Mo. He studied at Purdue University in 1892. From 1891 to 1902 he served in the United States Army, and was retired with the rank of captain on account of wounds received in action in the Philippines. He was professor of military science at Purdue University and the University of Vermont until 1915, when he was appointed president of Norwich University. During the War he served on the Mexican border and in France and rose to the rank of colonel and adjutant-general. He served as a member of the War Claims and War Credits Board in Washington in 1919, and then became president of the Reeves Engineering Company of Tulsa, Okla. He wrote *Bamboo Tales* (1901); *A B C of Rifle, Revolver, and Pistol Shooting,* and *Military Education in the United States.*

REFLEX. See ACTION; ANIMAL PSYCHOLOGY.

REFORMED EPISCOPAL CHURCH. Intense discussion in the Protestant Episcopal Church in 1873 culminated in the withdrawal of many clergymen and laymen under the leadership of Bishop David Cummins, and the organization of the Reformed Episcopal Church. In polity and doctrine it accords with the Protestant Episcopal Church, except that it looks upon the episcopacy as an ancient and desirable form of church government, rather than as of divine right, denies that Christian ministers are "priests," does not demand the re-ordination of clergymen of other denominations who enter its ranks, does not organize its bishops in a separate house in the General Convention, and denies baptismal regeneration. The membership of the denomination increased by 27.5 per cent, from 10,800 in 1913 to 13,750 in 1922, the number of churches from 80 to 81, and the number of Sunday school pupils from 9496 in 1918 to 10,075 in 1922. The number of ministers decreased from 83 to 81. Home mission work was carried on throughout the period among the Negroes of the South; foreign mission work in India comprised eight stations with six missionaries and 20 native helpers, 17 primary schools, two hospitals and one orphanage. The denomination supported a theological seminary at Philadelphia.

REFUSE DISPOSAL. See GARBAGE AND REFUSE DISPOSAL.

REGIMENT. See ARMIES AND ARMY ORGANIZATION.

REGISTRATION OF BIRTHS. See CHILD WELFARE.

REGULAR ARMY, UNITED STATES. See ARMIES AND ARMY ORGANIZATION.

REID, E. EMMET (1872–). An American chemist, born at Fincastle, Va., and educated at Richmond College and at Johns Hopkins. During 1898–1901 he was professor of chemistry at the College of Charleston, S. C., after which he filled a similar chair at Baylor University, and then during 1908–11 he was again at Johns Hopkins, for research work. In 1911 he became research chemist for Colgate and Company but in 1914 accepted a call to return as associate professor of chemistry to Johns Hopkins, where in 1916 he became professor of organic chemistry. During the War he was associated in gas warfare investigations under the Bureau of Mines His original investigations were almost entirely confined to organic chemistry and relate to such subjects as hydrolysis and alcoholysis of acid amines; thio acids and alcohols and their esterification; organic sulphur compounds; and organic catalysis. Besides many papers contributed to the *American Chemical Journal* and similar publications, he published a translation of Sabatier's *Catalysis in Organic Chemistry* (1921).

REIMS. See WAR IN EUROPE, *Western Front.*

REINER, FRITZ (1888–). A Hungarian conductor, born at Budapest. He studied under Thomann and Kössler at the Landesmusikakademie there and in 1900 became conductor at the Comic Opera. In 1910 he was first conductor at the Landestheater in Laibach and in the following year at the Volksoper in Budapest. His appointment as principal conductor at the Hofoper in Dresden, as Schuch's successor (1914), offered him the opportunity for the full development of his exceptional powers, so that in a short time he was in great demand as a guest conductor and appeared also in Spain and Italy. In 1922 he became Ysaÿe's successor as conductor of the Cincinnati Symphony Orchestra.

REINHARDT, MAX (1873–). A German theatrical director and manager (see VOL. XIX). In 1919 he founded the Grosses Schauspielhaus, a theatre as large as the New York Hippodrome, specializing in impressionistic mass effects. As a master of the new stagecraft Reinhardt toured the United States in 1923. He presented *The Miracle*, one of the largest theatrical pageant-spectacles ever produced, in New York City under Morris Gest's management

REISS, ALBERT (1870–). A German dramatic tenor, born in Berlin. He had begun a successful career as an actor when Pollini discovered his voice and persuaded him to study for the operatic stage. He made his début in Lortzing's *Zar und Zimmermann* at the Stadttheater in Königsberg (1897). He then sang at Posen, Wiesbaden, and Munich In 1901–17 he was a member of the Metropolitan Opera Company, with which he became specially identified with the rôles of David (*Meistersinger*) and Mime (*Siegfried*). He also created there the principal tenor parts in the world premières of Puccini's *Fanciulla del West* (1910), Humperdinck's *Konigskinder* (1910), Parker's *Mona* (1912), Damrosch's *Cyrano de Bergerac* (1913), De Koven's *Canterbury Pilgrims* (1917), and in the American première of Smetana's *Bartered Bride* (1909). In 1916 he organized the Society of American Singers for the purpose of producing in English the more intimate operas which lose much of their effectiveness in a large auditorium. He staged the American première of Mozart's *Schauspieldirektor* (October 26) during its first season in New York; in the following year Pergolesi's *La Serva Padrona* (May 7), Donizetti's *Il Campanello di Notte* (May 7), and Gounod's *Le Docteur Miracle* (May 10) had their American premières. He resigned in 1918 and was succeeded by William Hinshaw (q.v.).

REJUVENATION. See SECRETIONS, INTERNAL.

RELATIVITY. See ASTRONOMY; PHILOSOPHY; PHYSICS.

RELIEF ADMINISTRATION, AMERICAN. An organization built up by Herbert Hoover shortly after the Armistice as an agency to administer American relief and assistance to countries in Europe devastated and impoverished by the War. An Act of Congress, approved Feb. 24, 1919, appropriated $100,000,000 for European relief to be used "as a revolving fund until June 30, 1919"; and President Wilson by Executive Order (Feb. 24, 1919) placed all matters pertaining to the furnishing, transportation, distribution and administration of supplies under this Act under the direction of Hoover as director general of the American Relief Administration. In this capacity, as director general of relief for the Allies and as member of the Supreme Economic Council, Hoover coördinated the inter-Allied efforts for relief and economic reconstruction. The object of the A.R.A. was to assist new states and governments exhausted by war to help themselves. Food valued approximately at $400,000,000 was supplied to these countries for gold or negotiable securities. For additional supplies which were necessary, but for which the governments concerned were unable at the time to pay cash, the American government accepted obligations amounting to some $300,000,000. A further $30,000,000 was spent by the A.R.A. during this period for the relief of waif and undernourished children. The general relief operation under the Congressional appropriation was completed in the autumn of 1919, but the care of children in the Baltic and central European states was continued by the A.R.A. Relief measures for the year 1919–20, organized by Hoover and administered by the A.R.A., amounted to more than $100,000,000, of which about $50,000,000 came from Congress. American supplies began to reach Europe in great quantities early in 1919 and were distributed by representatives of the A.R.A. in Finland, Esthonia, Latvia, Russia, Lithuania, Poland, Danzig, Germany, Czecho-Slovakia, Austria, Hungary, Rumania, Jugo-Slavia, Armenia, Georgia, and Bulgaria. The A.R.A. not only delivered food to these countries but contributed to their rehabilitation through the control of shipping, railways, and mines in eastern Europe, the Peace Conference having made Hoover the mandatory in these economic activities in the territories of the former Austro-Hungarian Empire. Supplementing the general relief programme was a programme of child relief, in liberated and enemy countries, carried out under the A.R.A. European Children's Fund. The A.R.A. also coöperated in the campaigns against typhus in Poland and Rumania and established a money exchange system to facilitate the sending of aid from residents in America to relatives and friends in Europe from whom they had been cut off during the War. An adjunct of these operations was the food draft system, by which persons in America and elsewhere could buy drafts in favor of designated persons in central Europe to whom the A.R.A. delivered a specified amount of food. This arrangement afforded a vast amount of direct relief that otherwise would have been unavailable. Members of the A.R.A. contributed to reconstruction by serving as technical advisers to the new governments In 1920, under Hoover's leadership, the A.R.A. joined with other American relief agencies in a national appeal for funds for the support of European children; this resulted in the collection of $29,000,000. The A.R.A., continuing its child-feeding operations in the Baltic and central European states, reached 3,500,000 children in the year 1920–21. In addition to the children's kitchens and the food drafts, the A.R.A. delivered large quantities of clothing to the needy and administered specially contributed funds for the relief of students, teachers, doctors, and other members of the professional and salaried classes, whose suffering was particularly acute because of economic conditions. On its withdrawal from these countries in 1921–22 the A.R.A. left in operation efficient child welfare organizations established in the course of its work. In 1921 the A.R.A. answered the appeal of the Russian Soviet government to give aid in the famine, which, as a result of the drought and the economic demoralization of the country, threatened to bring death to millions through starvation or disease. On the basis of an agreement with the Soviet government, made at Riga, Aug. 20, 1921, the A.R.A. began with a programme for 1,000,000 children, which it rapidly expanded as funds became available until it reached its peak in August, 1922, when nearly 11,000,000 children and adults were receiving a daily ration from the A.R.A. Side by side with the feeding operations, the A.R.A. conducted a food and clothing remittance system, similar to the food drafts

for central Europe; it carried out a vast medical relief programme, which included the rehabilitation of 15,000 hospitals and institutions, the vaccination and inoculation of 7,000,000 persons, and a general campaign of sanitation in the principal cities and towns of Russia The A.R.A. in Russia, which operated some 20,000 feeding stations, consisted of an American staff of 200 with a Russian organization of 120,000 workers. The funds for the Russian relief totaled approximately $65,000,000, of which $24,000,000 came from an appropriation by the United States Congress, $12,000 000 from the Russian Soviet government, $3,600,000 from the American Red Cross, $4,000,000 from the Jewish Joint Distribution Committee, and the remainder from gifts made directly to the A.R.A. or to other relief organizations coöperating in this enterprise. The arrival of American supplies in Russia checked the famine in the early summer of 1922, and by the autumn of that year the food situation had sufficiently improved to permit the discontinuance of adult relief. The A.R.A. continued, however, during the following winter, spring, and summer, to care for Russian children and to deliver medical relief. New funds permitted a special programme of aid to teachers in the secondary schools and other institutions; this saved many lives and kept open a great number of schools. Withdrawing from Russia in July, 1923, the A.R.A. left supplies sufficient for the continuance of its programme until the harvest of that year. All European offices of the American Relief Administration were closed and all personnel withdrawn in the autumn of 1923 The totals of supplies handled from all quarters exceeded $1,000,000,000; relief was provided, one time or another, to more than 200,000,000 persons, besides direct service to more than 11,000,000 orphan and destitute children.

Officers of the American Relief Administration at the end of its European operations were: Herbert Hoover, chairman; Julius H. Barnes, vice chairman; Edgar Rickard, director general; Edward M. Flesh, comptroller; Gates W. McGarrah, treasurer; George Barr Baker, director of State organizations; Walter Lyman Brown, director for Europe; Col. William N. Haskell, director in Russia

RELIEF IN BELGIUM, COMMISSION FOR. See BELGIUM.

RELIGION, PRIMITIVE. See ETHNOLOGY.

RELIGIOUS CONTROVERSIES. The decade 1914–24, especially in its later years following the War, was marked by a remarkable revival of religious controversies in several of the larger Protestant denominations. Those chiefly affected were the Baptist, Methodist, Presbyterian, and Protestant Episcopal. In the main, these dissensions centred about the old differences between liberal and conservative interpretations of the Scriptures and creeds. They correspond to a large extent to the struggle against Modernism which for many years was carried on in the Roman Catholic Church. In connection with them there emerged a new term, Fundamentalism. Although this was applied especially to the controversy between the Liberal and Conservative elements in the Baptist denomination, it also described essentially the character of the disagreements in the other denominations. Fundamentalism is defined by one of its adherents as "merely an uprising of orthodox supernaturalism against modern naturalism." Those opposed to Fundamentalism describe it as a movement among ultraconservatives to keep religion in the bonds of supernaturalism.

It is generally admitted that the conditions which followed the War were largely responsible for the revival and development of this struggle between the liberal and conservative wings. Fundamentalism, however, is more than a reaction. It is the culminating point of a tendency which has been gathering strength for at least 30 years. The controversy in its widest sense turns on the view held in regard to the Scriptures. The Fundamentalists or conservatives assume an inerrant Bible, literally inspired and authoritative throughout, and they view as inimical to Christian doctrines any theory or interpretation which contradicts the literal interpretation of the Scriptures. Thus they come into conflict with the doctrine of evolution or Darwinism, and strong attacks were delivered, not only in the pulpit, but in the schools, against the teaching of the theory of evolution. Indeed, in several States in 1922 and 1923, the Legislatures adopted resolutions prohibiting the teaching of evolution in the school systems. Among the most ardent opponents of the evolution theory was W. J Bryan, who devoted much of his time to attacking the doctrine on the platform and elsewhere

In the Baptist denomination, where the controversy was especially fierce, it was estimated by Dr. Shailer Mathews of the University of Chicago in 1923 that the Fundamentalists in that year controlled about one-fourth of the evangelical churches in the East, about half the evangelical churches in the Middle West and South, and about three-fourths of the evangelical churches in the Far West. The Fundamentalists themselves claimed in that year to control nine-tenths of the laity of the churches. In the Presbyterian denomination the struggle took on great intensity from 1922 to 1924. *The Presbyterian*, an important church organ, declared that "Rationalism and Evangelicism are antagonists that can never be reconciled; it is vain to try to plaster up a union between them." Professor Machen of the Princeton Theological Seminary stated that "modern Liberalism is not only a different religion from Christianity but belongs to a totally different group of religions." In New York City a particularly bitter controversy arose over the preaching of Dr. Harry Emerson Fosdick, a Baptist clergyman, at the First Presbyterian Church. He was one of the chief advocates of Liberalism, and efforts were made at various times to prevent his occupying a Presbyterian pulpit.

In the Protestant Episcopal Church the controversy turned on the interpretation of certain doctrines, especially the virgin birth and the bodily resurrection of Christ. In November, 1923, at a special session of the bishops of the church held in Dallas, Texas, a pastoral letter was drafted in which the declaration was made that to deny or to suggest errors as to the facts stated in the Apostles' Creed was irreconcilable with oaths taken by ministers of the church, and that objections to the virgin birth and the bodily resurrection are contrary to the best traditions and that these doctrines are abundantly proved by scholarship. This letter was appointed to be read in all the churches. It at once aroused opposition and hostility among the advocates of liberalism. Dr. Leighton Parks, rector of St.

Bartholomew's Church in New York City, after reading the letter in compliance with the direction of the bishops, removed his robes and attacked their action as cowardly and unjustified. Bishop Lawrence of Massachusetts also strongly dissented, and so did other prominent clergymen throughout the country. The Rev. Lee W. Heaton, rector of a church in Fort Worth, Texas, who denied the virgin birth and other doctrines, was threatened with trial for heresy.

One of the most notable controversies was that between Bishop Manning of New York and Dr. Percy Stickney Grant, rector of the Church of the Ascension. Dr. Grant had for many years preached Liberalism and had several times been reproved by the bishop, not only for his preaching such doctrines, but for the maintenance of a so-called Forum in his church, in which opportunity was given persons of all beliefs and theories to explain and advocate their causes. Dr. Grant, early in 1924, specifically affirmed his disbelief in the virgin birth and other doctrines. For this he was called to account by Bishop Manning, and letters were exchanged between them. Later he resigned on the ground of ill health.

At the annual conventions of the various denominations held in 1924, Fundamentalism as against Liberalism was an issue. At the Northern Baptists' Convention held in Milwaukee in June, the Fundamentalists were well in control. At the annual assembly of the Presbyterian Church of the United States at Grand Rapids in the same month, the Fundamentalists were in the majority and elected W. J Bryan vice moderator Dr William P. Merrill, pastor of the Brick Presbyterian Church in New York City, one of the leading Liberal clergymen, was removed from the Foreign Missions Board. Dr. Fosdick was requested to join the Presbyterian Church "if he can adopt the doctrinal standards of our church as contained in the Westminster Confession." The Liberals, however, gained a victory in defeating a proposal to pass five points of doctrine which would have bound all Presbyterian clergymen to literal interpretation of certain Bible passages. At the Quadrennial Conference of the Methodist Episcopal Church, held in Springfield, Mass., in May, 1924, an attempt to pass a so-called Declaration of Faith presented by Fundamentalists was defeated Fundamentalism, however, was approved by the delegates. In the opinion of many leaders on both sides, the controversy was likely to lead to the formation of a new denomination in which members of older denominations who advocate liberal beliefs and freedom from literal interpretation of the Scriptures will be obliged to take refuge.

RELIGIOUS DENOMINATIONS. See articles on the respective denominations.

REMINGTON, WILLIAM PROCTOR (1879–). An American bishop, born at Philadelphia, and educated at the University of Pennsylvania and the Theological Seminary of Virginia He was ordained to the priesthood in the following year and was a curate and rector of several churches in Philadelphia until 1911, when he became rector of St. Paul's Church, Minneapolis, Minn. In 1918 he was consecrated suffragan bishop of South Dakota and served as chaplain in the War. He was an official and trustee of several church societies.

RENSSELAER POLYTECHNIC INSTITUTE. A school of engineering and science, at Troy, N. Y., established in 1824, offering graduate and undergraduate courses in civil, mechanical, electrical and chemical engineering and in general science. The institute expanded during the decade between 1914 and 1923–24 both in numbers and equipment. The registration in 1923–24 was 1140, compared with 640 in 1914; the faculty numbered 94 as compared with 63 in the earlier year; and the productive funds increased from $1,350,000 to $2,850,000. In 1922, a great radio broadcasting station was established which claimed the record for long distance, transmission from it having been heard for a distance of 10,000 miles. A gauging station to be used by the students under the direction of the United States Geological Survey was established in 1923. During the 10 years the number of endowed scholarships carrying free tuition was increased by four, and 10 new fellowships for graduate students, each of a value of $750 a year, were created. In 1914, the total property of the school was valued at $2,850,000 and in 1924 the value was more than $6,000,000. President, Palmer C. Ricketts, E.D., LL.D.

RENT LAWS. See LAW, PROGRESS OF THE; HOUSING

REORGANIZED CHURCH OF JESUS CHRIST OF LATTER DAY SAINTS. This is the smaller of the two bodies known as Latter Day Saints, bearing the distinctive term "Reorganized" as part of its church title. It was founded in Wisconsin in 1852 in succession to the original Church of Jesus Christ of Latter Day Saints established at Fayette, New York in 1830 by Joseph Smith. The Reorganized Church is identical in faith and principles with the original church, but, unlike the other organization, has always repudiated plural marriage. Its membership increased from 73,899 in 1915 to 95,365 in 1923; the number of ministers increased to 6136; and the number of Sunday Schools from 637 to 875, and pupils from 33,062 to 60,376. The denomination maintains Graceland College at Lamoni, Iowa, and the Independence Institute of Arts and Science at Independence, Mo., and publishes several periodicals.

REPARATIONS. The subject of reparation by Germany and her confederates for damages done to the Allied countries during the War constituted one of the most difficult and complicated of the multifarious problems considered at the Peace Conference of Paris in 1919. Only tentatively and unsatisfactorily dealt with at that time, it subsequently remained the key factor in the economic rehabilitation of Europe and a perennially potent menace to international peace and security. Inveterate international practice had consecrated the right of the victor to recover, if possible, the costs of war from his defeated enemy; the classic example of an indemnity was the $1,000,000,000 penalty imposed by the German allies on France at the conclusion of the Franco-Prussian War (1870–71). *Vae victis!* The first formal though secret reference known to have been made to this subject by the Allied governments during the War was in the Treaty of London (Apr. 23, 1915), which promised Italy, besides many other things, "a share of the war indemnity." In their pronouncement of Dec. 30, 1916, the Allied governments asserted: "The disasters caused by the German declaration of war and the innumerable outrages committed by Germany and her allies against both belligerents

and neutrals, demand penalties, reparation, and guarantees" In their note to President Wilson, Jan. 10, 1917, they explained that their war-aims, "with all the compensation and equitable indemnities for harm suffered," would only be set out in detail when the time came for actual negotiations, although they avowedly included "necessarily and first of all, the restoration of Belgium, Serbia, and Montenegro, with the compensation due to them," and the "evacuation of the invaded territories in France, in Russia, and in Rumania, with just reparation." In his war-aims address of Jan. 5, 1918, Lloyd George reiterated these objects, declaring that the British government and the Allies demanded the "complete restoration . . . of the independence of Belgium and such reparations as can be made for the devastation of its towns and provinces. This is no demand for war indemnity as was imposed on France by Germany in 1871. *It is not an attempt to shift the cost of warlike operations from one belligerent to another*, which may or may not be defensible. . . . Next comes the restoration of Serbia, Montenegro, and the occupied parts of France, Italy, and Rumania. . . . Finally there must be reparation for injuries done in violation of international laws"

This clear-cut pronouncement, so remarkable in the light of the speaker's subsequent vagaries, promptly elicited (January 6) a telegram from Premier Clemenceau congratulating him for having so felicitously summarized "the actual truths." The same specific aims were later incorporated by President Wilson in his famous "Fourteen Points" address of Jan. 8, 1918 (Points 7, 8, and 11). The President, however, made no reference to indemnities for war costs, and his conception of reparations for damage done, as therein expressed, was distinctly limited in scope. Indeed, in his "Four Principles" address of Feb. 11, 1918, Wilson categorically asserted: "*There shall be no annexations, no contributions, no punitive damages.*" On Dec. 4, 1917, he had explained to Congress that "the wrongs, the very deep wrongs, committed in this war, will have to be righted. . . . But they cannot and must not be righted by the commission of similar wrongs against Germany and her allies" This principle and purpose he reiterated on Sept 27, 1918, in the much-quoted sentence that "the impartial justice meted out must involve no discrimination between those to whom we wish to be just and those to whom we do not wish to be just." The Armistice terminating the War was avowedly predicated on the acceptance both by the Entente Powers and by Germany of the principles enunciated by Wilson in his successive addresses of 1918. The Peace Conference was to discuss the practical details of their application. To be sure, one of the reservations made by the Supreme Council (Nov 4, 1918) was to the effect that provision for the evacuation and restoration of all invaded territories expressly implied that compensation would be made by Germany "for all damage due to the civilian population of the Allies and their property by the aggression of Germany by land, by sea, and from the air," but the exact force and extent of the obligations created by these conversations were rendered lamentably obscure by a qualifying clause in Article 19 of the Armistice Convention itself, stipulating that subsequent financial concessions and claims by the Allies and the United States should remain unaffected. Around the interpretation of these conditions a diplomatic and legal battle was destined to rage.

With the emotional reaction of the post-Armistice period came a significant realignment of facts and forces. As the extent of Germany's collapse came to be known, greater demands were made for her condign punishment. In the parliamentary election of Dec. 14, 1918, in Great Britain, Lloyd George's coalition government catered to the popular demand for a retributive peace by promising to recover the whole cost of the War, "shilling for shilling" and "ton for ton." Lord Cunliffe, ex-Governor of the Bank of England, estimated Germany's liability to pay as aggregating the stupendous sum of $100,000,000,000, a total which the Premier shortly afterward augmented to $120,000,000,000. In France, the Clemenceau cabinet and the overwhelming majority of the French people were formulating equally extreme demands. The imposition of taxes was postponed in response to popular claims, and by skillful propaganda the masses were convinced that Germany could, should, and would be made to pay the full costs of the War. On Jan. 25, 1919, at the second plenary session of the Peace Conference, a commission was appointed to examine and report, first, on the amount which the enemy countries ought to pay by way of reparation; secondly, on what they were capable of paying; and thirdly, on the method, form, and time in which payment should be made Two main controversies marked the discussions of the ensuing months: (1) that over permissible categories of damage; and (2) that over Germany's real or alleged capacity to pay. Of the 31 categories suggested to the Commission, 10 were ultimately incorporated in the Treaty of Versailles. It was universally agreed that direct damage to persons or property should be compensated, and certain other claims occassioned little conflict, but not so with war-costs.

Mr. Hughes and Lord Sumner of the British delegation bluntly argued that since ultimately all war costs had to be met by general taxation, they constituted damage done to civilian populations in the Allied countries and might therefore be legitimately included in the reparations bill This view received the keen support of the French, whose interest in reparations was subordinate only to their primary consideration of security. (See PEACE CONFERENCE AND TREATIES.) So fearful were they of a German revival, so completely exasperated and antagonized by the systematic and intentional destruction of their industrial regions, that they proved even more anxious than the British to cripple Germany economically. Consequently they favored assessing the entire cost of the War on the vanquished foe despite the fact that although the absolute amount of their claim might be substantially increased thereby, their relative share in the total receipts would nevertheless be greatly diminished. The Belgians, anxious for complete indemnification and priority of payment, expressed serious concern lest the extension of Allied claims far beyond the finite capacity of Germany to pay would eventually deprive Belgium of her due. The Americans, renouncing any claims for themselves, attacked the inclusion of war-costs as violating pre-Armistice pledges. The dispute was referred to the Supreme Council on March 1, and the refusal of the American experts to accede to the British and French demand was

subsequently upheld by President Wilson, who denounced the course contemplated and declared that he would "dissent publicly, if necessary, not on the ground of the intrinsic injustice of it, but on the ground that it is clearly inconsistent with what we deliberately led the enemy to expect and cannot now honorably alter simply because we have the power."

This rejection of their original demand impelled the British and French to insist on the inclusion of pensions and separation allowances, which would serve the purpose not only of making the total payment to be demanded of Germany relatively enormous, but also of appeasing the British demand for a more equitable remuneration than the Empire would receive on the basis of reparations for damages alone The Americans vigorously combated this new proposal, which in some measure vitiated their victory in the war-costs controversy; but the necessity for compromise following the bitter crisis with the French in early April (see PEACE CONFERENCE AND TREATIES) in combination with some rather illogical and sentimental arguments advanced (Mar. 31, 1919) by "the ordinarily liberal-minded" General Smuts of South Africa finally convinced Wilson of the advisability of including pensions and reparations allowances, thereby more than doubling the reparations bill. The German delegation in its Comments on the Conditions of Peace, of May 29, 1919, expressed complete inability to recognize these claims as having "a legal title, as they apply to direct war-costs and not to damages done to the civilian population by an act of war"; and in this contention impartial legal opinion must sustain them.

Equally keen was the struggle waged from January to June over the question of Germany's capacity to pay. The French proposals were fantastic, the most extreme calling for a total of $200,000,000,000 to be collected in some 50 annual installments. British suggestions ranged from the Lloyd George-Cunliffe estimate of $120,000,000,000 to the Liberal Keynes's approximate $10,000,000,000 The Americans, vitally interested in the speedy reëstablishment of normal economic relations, labored indefatigably for the stipulation of a definite and moderate total sum, for they were of the opinion that any reasonable though arbitrary fixation would be greatly preferable to the uncertainty and consequent disorganization of Germany's credit sure to result from postponement, and they argued that France, the greatest creditor of Germany, "would benefit most by taking everything that she possibly could, by taking it quickly and writing off the balance." Their extreme proposal was for a capital sum of $58,000,000,000 to be paid in 30 years, but the basic figure which they later consistently advocated was a total of $25,000,000,000. Both the British and French premiers feared to accept the moderate proposals of the Americans because they fell so far below the expectations of their respective peoples Indeed at one juncture the seeming acquiescence of Lloyd George in plans for a reasonable settlement evoked a telegram from 370 members of the newly-elected "khaki" Parliament, warning him that they expected the fulfillment of his electoral pledges. Had the Americans offered to cancel outright or to abate appreciably the enormous indebtedness of the Allies to the United States as the "essential American contribution toward a new coöperative plan for restoring Europe and the world," they would *ipso facto* have enjoyed a "powerful trading weapon in securing the settlements they desired." This, however, they consistently refused to do, asseverating that these debts "had nothing to do with reparations or rehabilitation." A special committee of liberal-minded experts, British, French, and American, appointed in March to investigate the matter, concluded that "Germany might possibly pay from $10,000,000,000 to $20,000,000,000 over a period of 20 to 30 years." This sound conclusion was wholly unacceptable to the more conservative advisers and plenipotentiaries The committee then sought to attain the definition of a flexible sum, "adjustable as to amount and means of payment, within certain maximum and minimum limits." For the execution of this scheme they proposed a Reparation Commission endowed with rather large powers and capable of becoming an instrument of "wisdom and justice." The French, seeing a chance to postpone the fixing of a definite sum of reparations and thereby to keep Germany uncertain and to avoid domestic disillusion, jumped at the suggestion and advocated a commission, but one empowered to register the claims of the various countries under the different legitimate categories and to settle the figure of the annuities and the period of payment "The only consideration given to Germany's capacity to make payments would be in the form of lengthening the period given her to complete them—which, by the accumulation of interest on the unpaid portion, might be extended to infinity. It practically amounted to a perpetual economic control of Germany by an Allied Commission."

The whole question came to a crisis late in March. President Wilson and his advisers fought the French proposition bitterly. Lloyd George, guided by the dictates of expediency alone, agreed now with one side, then with the other. Unfortunately the definitive decision was made by the Council of Four during President Wilson's illness. His colleague Colonel House, representing the United States, in a too conciliatory spirit yielded to the threats and importunities of Clemenceau (Apr. 7, 1919). The problem of reparations affected not merely Germany, but the other Central Powers as well. In their respective treaties Germany, Austria, and Hungary accepted the responsibility for causing "all the loss and damage" to which the Allied and Associated Powers were subjected; and they were made jointly and severally liable for the whole amount. Bulgaria, on the other hand, was obliged to acknowledge that she had "caused losses and sacrifices of all kinds for which she ought to make complete reparation"; in other words, to assume separate responsibility for certain damages. On the Allies' side arrangements for dividing the receipts were necessary. At the Peace Conference after a protracted struggle between the French and the Italians, the general principle was adopted that each Allied state was to share jointly with the other Allies in damage payments by any enemy nation for "all operations of war by the two groups of belligerents wherever arising." Belgium received special consideration. In addition to promised reimbursement for all her war-costs, a just decision in view of her violated neutrality, she demanded priority of payment. Her representatives urged their most sweeping demands during the French crisis in early April

and again during the period of threatened disruption over the Italian and Japanese settlements in late April. Lloyd George vehemently opposed granting any concessions to the Belgians, but largely owing to American support and the eventual winning of French consent they were accorded a priority of $500,000,000 in addition to compensation for the entire war costs.

In addition to protesting against the inclusion of pensions and separation allowances, the German delegation in its comments on the conditions of peace (May 29, 1919) further sought an immediate and definite fixation of their liability; they offered, subject to the modification of certain economic terms, to make periodic payments in the form of annuities commencing in 1927 and amounting to 100,000,000,000 gold marks, a sum whose approximate 1919 capital value amounted to 40,000,000,000 gold marks. Lloyd George made a short-lived and half-hearted attempt to moderate the reparations burden, but it was eventually decided to reject the German proposition outright.

The Treaty of Versailles (June 28, 1919) attempted to settle the question of German liability by distinguishing between moral responsibility and material compensation. "The Allied and Associated governments," according to Article 231, "affirm, and Germany accepts, the responsibility of Germany and her allies for causing all the loss and damage to which the Allied and Associated governments and their nationals have been subjected as a consequence of the war imposed on them by the aggression of Germany and her allies." "The Allied and Associated governments recognize that the resources of Germany are not adequate . . . to make complete reparation for all such loss and damage. The Allied and Associated governments, however, require, and Germany undertakes, that she will make compensation for all damage done to the civilian population of the Allied and Associated Powers and to their property during the period of the belligerency of each as an Allied or Associated Power against Germany by such aggression by land, by sea, and from the air, and in general all damage as defined in Annex 1 hereto" (Article 232). Annex 1 set forth the 10 categories alluded to above, including pensions and separation allowances. A Reparation Commission was to be established composed of five members, four of whom were to be representatives of the United States, the British Empire, France, and Italy respectively, and the fifth to represent Belgium, Japan, or Jugo-Slavia, according to the specific nature of the business engaging the Commission's attention. Most of the important decisions had to be unanimous. After receiving reports of the various governments as to the extent of their claims under the various categories, the Commission was to calculate the sum total of Germany's obligations and concurrently draw up a schedule of payments prescribing the time and manner of payment within a period of 30 years from May 1, 1921. It was given discretion to extend the term and also to modify the form of payments but not to cancel any part, except with the specific authority of the several Allied governments concerned. In order to enable the Allied and Associated Powers to proceed at once to the restoration of their industrial and economic life, pending the full determination of their claims, Germany was to pay in gold, commodities, ships, securities, or otherwise, before May 1, 1921, the equivalent of 20,000,000,000 gold marks, from which should be deducted the cost of the armies of occupation and certain limited sums for the purchase of food and raw materials. Germany agreed to apply directly to reparations her economic resources, including merchant shipping, coal, dyestuffs, and chemicals, and to make restitution of cash, securities, animals, and objects of art seized or sequestrated. Provision was to be made for the issuance of several series of gold-bearer bonds as determined by the Reparation Commission. Other provisions of the treaty deprived Germany of territory, population, and resources, thereby gravely impairing her capacity to pay. The German Empire, "built more truly on coal and iron than by blood and iron," had the economic foundations of its prosperity virtually swept away.

The Treaty of St. Germain (Sept. 10, 1919) required Austria to pay "a reasonable sum" on account before May 1, 1921, and to hand over all her merchant marine, 20 per cent of her river shipping, and animals, machinery, and equipment up to the limit of her capacity. The total amount due from Austria for reparation was to be fixed in May, 1921, by the Reparation Commission. A special settlement of the Austro-Hungarian debt was arranged (see AUSTRIA). In 1921, due to Austria's distressing financial and industrial condition, the Allies decided to waive, for the time being, all their outstanding claims against her on account of reparation. The Treaty of Neuilly (Nov. 27, 1919) obligated Bulgaria to pay 2,250,000,000 gold francs in half-yearly installments of 37 years. Up to April, 1922, Bulgaria had paid 799,000,000 gold francs, and in the spring of 1923, first of all the vanquished nations, she was able to make definite and satisfactory arrangements with the victors. Hungary, by the Treaty of the Trianon (June 4, 1920), was to pay a reasonable sum, fixed by the Reparation Commission, before May 1, 1921, when her total liability was to be fixed by the same body, with provisions for the discharge of the balance in semiannual installments over a period of 30 years unless a respite or remission were granted by the Allies. She had to surrender all her merchant shipping, 20 per cent of her river fleet, and an indefinite quantity of live stock. Hungary's payments were long delayed by her presentation of counterclaims against Rumania for losses sustained during the invasion of 1919. By the Treaty of Sèvres (Aug. 10, 1920), the Allies waived their claims for reparation from Turkey, although she was obligated to pay the costs of Allied armies of occupation and to compensate civilian nationals of the Allies for loss or damage suffered in the War through the action or negligence of the Turkish authorities; but even these claims were canceled by the later Treaty of Lausanne (July 23, 1924). The Reparation Commission, tentatively organized in June, 1919, was put into formal operation in January, 1920. Although, according to the Treaty of Versailles, it was to have "wide latitude as to its control and handling of the whole reparation problem," including the interpretation and administration of the reparations sections of the treaty and the receipt and distribution among the Allies of the payments made by Germany, it was also provided that members of the Commission should be responsible to their respective governments alone. Consequently the subsequent history of the reparations problem revolved not merely around the

deliberations and decisions of the Reparation Commission but also around intricate and interminable negotiations between and among the various governments, with a view to achieving a settlement in consonance with seriously divergent and seemingly irreconcilable national interests. The theme of reparations thenceforth is one of confusion and of international maladjustment, of stern economic realities obfuscated by political vagaries and extravagances, of persistent French intransigeance and a ruthless determination to coerce Germany into paying or to ruin her, of British vacillation and ultimate reversal of policy dictated by inexorable economic considerations, of German official remissness amounting to defiance and a struggle on the part of German industrialists to escape their obligations, and of American aloofness and short-sighted pursuit of national economic advantage and a mythical political isolation.

Reparations constituted perhaps the most important single item on the agenda of the long series of Continuation Conferences inaugurated in the spring of 1920 to deal with the unliquidated problems of the peace. (See PEACE CONFERENCE AND TREATIES.) The Supreme Council of Allied Premiers overshadowed the Reparation Commission and usurped its functions. At San Remo in April it was decided to grant the Germans a hearing, although Premier Millerand of France, by yielding to Premier Lloyd George on Turkey and to Premier Nitti of Italy on Russia, secured a pledge that the Treaty of Versailles would be enforced to the letter. Lloyd George and Millerand conferred at Hythe (May 15–16) and at Boulogne (June 21–22) for a preliminary discussion of the measures to be taken. A special commission of experts being appointed to gauge the capacity of Germany to pay, Raymond Poincaré, French member and president of the Reparation Commission, resigned in protest. At Brussels on July 2, Allied experts tentatively advised that the German indemnity should be $60,000,000,000, including interest charges. No agreement was then possible as to the manner of distribution. Italy held out for 20 per cent. At Spa (July 5–16) Germany's request for a definite determination of the amount of reparation was denied. The discussion of coal deliveries threatened to disrupt the conference, but Germany yielded to an Allied ultimatum demanding 2,000,000 tons a month. A protocol signed at Spa on July 16 apportioned reparation receipts among the Allies as follows: France, 52 per cent; British Empire, 22 per cent; Italy, 10 per cent; Belgium, 8 per cent; Japan and Portugal, three-quarters of 1 per cent each; the remaining 6½ per cent was to be reserved for Jugo-Slavia, Greece, and Rumania. In the disposition of Austrian, Bulgarian, and Hungarian reparations a special arrangement was devised, 50 per cent going to the Powers in above-mentioned proportions, an additional 20 per cent to Italy, and 30 per cent to Greece, Rumania, and Jugo-Slavia.

Negotiations relative to reparations, continuing throughout the year, saw the development of serious differences between France and England over this question and also over Russia and Turkey. A joint conference of Allied and German economic experts was held at Brussels (Dec. 15–22, 1920, and Jan. 10, 1921). Here it was proposed that Germany should pay annual installments of 3,000,000,000 gold marks from 1921 to 1926, 6,000,000,000 from 1926 to 1931 and 7,000,000,000 thereafter until 1963. From January 25 to 29, 1921, the Supreme Council met at Paris. The French from the outset objected to a fixed sum, afterward insisting that it should not be less than 400,000,000,000 gold marks, including interest. Lloyd George, supported by the Italians, vigorously objected; and a compromise decision was reached. Subject to Allied sanctions in case of default, Germany was to pay within 42 years the sum of 226,000,000,000 marks or its equivalent on a sliding scale of annuities. The German government, supported by national sentiment, frankly asserted that they could not accept the Allied terms, although they consented to attend a new conference at London (Mar. 1–7, 1921), to which they had been summoned "to agree to the decisions of the Paris Conference." On March 1, the Germans offered to pay 50,000,000,000 gold marks present value, with a deduction of 20,000,000,000 for payments already made. Lloyd George, replying on March 3, rejected the German offer, insisted that Germany's responsibility for the War was decided by the Treaty of Versailles founded on that fact, and delivered an ultimatum requiring acceptance of the Allied reparation demands within four days. Lloyd George was supporting French plans in Europe in order to secure French acquiescence in British Near Eastern projects The German reply being deemed unsatisfactory, a force of French, Belgian, and British troops occupied the cities of Düsseldorf, Duisberg, and Ruhrort, in the heart of one of Germany's greatest industrial regions. The results of this coup de force were nugatory, however, and France threatened to occupy the whole Ruhr basin. New schemes were then propounded, including a German request for American mediation. A conference of the Entente Premiers was held at Hythe (April 23–24) to formulate a tentative programme for the enforcement of Allied terms. On April 27, the Reparation Commission announced that it had decided unanimously to fix at 132,000,000,000 gold marks the amount of damages for which reparation was due. Of this total, approximately 45,000,000,000 were for material damage and 87,000,000,000 for pensions and separation allowances. Germany was to pay this in addition to Belgium's war debt, provisionally estimated at 4,000,000,000 gold marks. Three series of bonds were to be issued, bearing 5 per cent interest and 1 per cent amortization: series A, comprising 12,000,000,000, and series B, 38,000,000,000, to be issued in 1921; and the third, series C, for 82,000,000,000, to be issued at the discretion of the Commission. Payments were to be made in the form of annuities supplemented by 26 per cent of the value of German exports. The acceptance of the Commission's reduction of claims without a murmur by the Supreme Council marked the end of the exclusively political period of the reparations question. The Allied Conference of London convened on April 30; on May 5 it dispatched to Germany an ultimatum requiring acceptance of these terms. Confronted with the threatened French occupation of the Ruhr, Germany yielded on May 10. The Fehrenbach ministry, organized in July, 1920, had been superseded during the crisis by a new coalition cabinet headed by Chancellor Wirth.

Although Germany subsequently sought modification of these terms, France insisted that she carry them out. The first payments due were paid, and on September 29 Düsseldorf, Duisberg,

and Ruhrort were evacuated. On Oct. 6, 1921, an economic pact was concluded at Wiesbaden by Rathenau and Loucheur, the German and French ministers of reconstruction; it provided for more effective reparation in kind, similar provisions in the Treaty of Versailles having been nullified by the obstructionist tactics of French industrialists and trade unionists France was to receive building materials from Germany in lieu of her share of the 26 per cent export tax, and Germany was to be credited with not more than 1,000,000,000 marks each year for 14 years to cover such deliveries Only a few deliveries were made under this plan, however, even as revised in 1922 Meanwhile the German government was encountering extraordinary difficulties in financing reparations payments due in part to the world-wide business depression and to the policy of truculent opposition of German industrial magnates, led by Hugo Stinnes. An economic conference held at Brussels during September under the auspices of the League of Nations deliberated on feasible measures to prevent financial and economic chaos in Europe, but although its discussions proved illuminating, its activities were relatively fruitless. Unsound war finance and peace-time burdens led to a marked decline in the value of German currency A serious flight of capital from Germany, effected through the exchange of marks for foreign currency, greatly aggravated the situation The fall of tax receipts to an insignificant value resulted in prodigious budgetary deficits which impelled the government to embark on an inflation policy, leading in turn to still further depreciation of the value of the mark. (See GERMANY.) All these factors tardily convinced the Reparation Commission that Germany needed relief from cash payments, and at brief intervals Allied conferences were held, at each of which the amounts currently payable by Germany were reduced. On Dec 14, 1921, the German government officially notified the Commission that it would be unable to pay the installment due Jan 15, 1922, or the other quarterly installments due in 1922, and in lieu thereof it proposed a smaller payment. This led to an Allied investigation and discussion of the problem at Conferences held at London on Dec. 22, 1921, and at Cannes on Jan. 4–13, 1922 Lloyd George offered France a defensive, political, and military alliance in return for a modification of its attitude toward Germany, but French public and parliamentary opinion was opposed to concession. The conference was suddenly disrupted by a ministerial crisis in France which resulted in the displacement of Premier Briand by ex-President Poincaré, an ardent nationalist and implacable enemy of Germany. This change in the French government presaged a serious rift in Entente solidarity and definitely prefigured the military occupation of the Ruhr. On January 13, the Reparation Commission granted a provisional and partial moratorium to Germany. On Jan 28, 1922, Germany offered to pay 720,000,000 gold marks cash annually, distributed evenly throughout the year with 1,450,000,000 gold marks annually in kind. On March 21, the Commission decided to grant Germany's request, although in addition it stipulated that Germany should institute sweeping reforms in her financial administration and prevent further flight of capital from the country.

Premier Poincaré, whose diplomatic policy diverged widely from that of Lloyd George, strongly advocated leaving the problem of reparation to the Reparation Commission. But it soon found its way into the agenda of the Supreme Council again. On Mar. 11, 1922, the Paris Conference requested the Commission to study the possibility of a German external loan. The International Bankers' Loan Committee, which met between May 24 and June 10, found such a plan impracticable so long as Germany's external obligations were not reduced. Meanwhile the 34 Power plenary conference held at Genoa (April 10–May 19), revealed even more strikingly the grave impasse in international reconstruction presented by the reparation and Russian problems. (See RUSSIA.) Prospects of a Russo-German rapprochement, signalized by the Treaty of Rapallo (April 16), which provided for the reëstablishment of diplomatic relations and mutual renunciation of war claims and financial obligations, recemented the Anglo-French entente temporarily, but otherwise the deliberations of six weeks proved devoid of practical consequences. On July 14, 1922, the German government requested an extended moratorium, and a somewhat reduced reparation payment was made under evident duress on July 15. The thirteenth inter-Allied Continuation Conference was convened at London during August, 1922, to discuss reparations and war debts. On August 1, the British foreign minister, Balfour, issued a note offering to remit all war loans due Great Britain and to abandon all further rights to German reparations if reciprocal action were taken by other nations He offered to cancel the $12,000,000,000 due Great Britain, if the United States would cancel the British obligation of $5,000,000,000 The American government refused to entertain any such proposition. At the London Conference the British and French premiers were absolutely deadlocked on the subject of German reparations, although Berlin was granted a respite on the August 15 payment and it was agreed that henceforth the obligation of collection should rest on the individual governments. Poincaré favored imposing stringent "productive guarantees" on Germany and suggested elaborate schemes for the control of German resources. On August 31, a compromise arrangement was devised, granting Germany a conditional respite for six months; simultaneously a new agreement for delivery of reconstruction supplies to France was negotiated by Hugo Stinnes and Senator de Lubersac. With the passage of months, however, the situation grew worse and worse. A committee of foreign financial experts reported that stabilization of the mark was dependent on Germany's own efforts. On Nov 8, 1922, the German government requested an indefinite moratorium on all payments and a revision of the total to be paid. Great Britain, more keenly desirous of stabilizing Germany and restoring the German market, consistently pursued a policy of opposing French militarism and of advocating the fixation of a definite and reasonable sum of reparation. Poincaré adhered to his policy of no concession and ruthless coercion. Belgium was definitely allied with France, while Italy, for business reasons, supported the British until the Fascist coup d'état produced an Italian dictatorship more sympathetically inclined toward French strong-arm measures The autumnal crisis in Near Eastern affairs (see PEACE CONFERENCE AND TREATIES) exacerbated Entente differences. The downfall of Italian, German, and British cab-

inets (see ITALY, GERMANY, and GREAT BRITAIN) failed to clarify or ameliorate the situation. Another Allied conference, attended at London (December 9–11) by the British, French, Belgian, and Italian premiers, accomplished nothing beyond exchange of views. On Dec. 26, 1922, the Reparation Commission, despite British opposition, declared Germany in voluntary default on 1922 wood deliveries. On Jan. 9, 1923, similar action was taken in regard to coal deliveries. Meanwhile, at an Allied conference in Paris (Jan. 2–4, 1923) detailed plans were presented for coping with the problems of reparations and international indebtedness. Great Britain and France, although agreeing on a reduction of the reparations total to 50,000,000,000 gold marks and the institution of a comprehensive financial control over Germany, were diametrically opposed on methods of guarantee. Bonar Law, combating the punitive measures proposed by Poincaré, declared that their execution would not produce reparation. The French, whose prime consideration was to maintain security by rendering Germany impotent, refused to agree to any practical programme.

France and England had reached the parting of the ways. On January 11, after preliminary warnings, a Franco-Belgian army occupied the Ruhr valley, the heart of industrial Germany, containing her principal coal and iron deposits, her greatest industrial establishments, and 7,000,000 inhabitants. The legality of this procedure was denied by the Germans and doubted by the British, but the French and Belgians, brooking no criticism, announced that they were acting under the provisions of Paragraphs 17–18 of Annex 2 to Part VIII of the Treaty of Versailles, which authorized the respective Allied governments in case of a voluntary default by Germany to take such measures as they deemed necessary. Although embarrassed from the outset by civil obstruction and passive resistance on the part of the inhabitants, including trade unionists and industrialists (see GERMANY), the French took strong measures of repression and retaliation, and by March they had an unbroken military and customs line stretching from Switzerland to Belgium and Holland All the horrors of military rule were enacted in the Ruhr, thousands of Germans being intimidated, incarcerated, or exiled, and the normal activities of industrial life almost completely suspended. For months the French and German governments remained obdurate in their determination not to yield, the British seeking in vain to effect a compromise settlement. Gradually Germany, seriously crippled by the disruption of her economic system, was forced to recede from her extreme attitude. On May 2 and June 9, 1923, she outlined a new proposal involving the mortgaging of her railway system, the offering of guarantees on other industries, and the pledging of certain import and excise duties to reparation payments. Guaranteed annuities, secured by these means, and totaling 1,200,000,000 gold marks, were to be paid after July, 1927. The Ruhr was to be evacuated and economic connections with Germany reëstablished. Germany also agreed to submit to determination by an international commission of her capacity to make further payments. On June 8, Poincaré flatly refused to iscuss any offer as long as the German resistance in the Ruhr continued. He made it perfectly clear that France and Belgium intended to retain control of the Ruhr until Germany paid the schedule of reparations fixed in May, 1921. By degrees the French had restored a semblance of economic order in the Ruhr region, and partial production was resumed. Nevertheless, Great Britain remained antagonistic, the United States appeared distinctly unsympathetic, Italy failed to back the Ruhr policy vigorously, opposition developed in Belgian labor and shipping circles, and protests were made by Sweden, Holland, and Switzerland. In a note of July 20, 1923, the British government, while pronouncing the German proposals unacceptable, suggested that they were at least worthy of consideration, and to this end it proposed an investigation of the reparations situation by a committee of impartial experts. An exchange of notes during the summer merely confirmed the French in their intransigeant attitude of utilizing only the Reparation Commission as an administrative or investigating body and of retaining the Ruhr until full payment was made by Germany. By September, 1923, German passive resistance in the Ruhr had definitely broken down and subsequently her industrial magnates were forced to come to terms with the French. A series of short-time agreements henceforth regulated German deliveries in kind.

On Oct. 5, 1923, the Reparation Commission announced that up to June 30, 1923, reparation payments had totaled 8,213,670,000 gold marks, of which 3,250,000,000 was in merchandise, 1,900,000,000 in cash, and the remainder in the form of credits for shippings, cables, Saar Valley mines, and ceded territories Of this total, 5,494,782,000 gold marks had already been allocated to Allied recipients: 1,255,339,000 to Great Britain, 1,803,967,000 to France, 1,730,126 to Belgium, 338,621 to Italy, 204,368 to Serbia, 68,368 to Japan, and lesser amounts to other countries. Germany, however, contended that she had paid gold and cash to a value of more than 45,000,000,000 gold marks. The most exhaustive nonpartisan study made up to 1924 would indicate that Germany had paid from 20,000,000,000 to 26,000,000,000 gold marks The advancing months of 1923 saw a slightly more coöperative attitude on the part of the American government. While the United States had maintained continuous unofficial relations with the Reparation Commission through "observers," she had consistently refused to be represented at any international economic conference. (See UNITED STATES.) In October, 1923, in response to British inquiries, the American government expressed the opinion that "competent American citizens would be willing to participate in an economic inquiry . . . through an advisory body appointed by the Reparation Commission" France, while emphasizing her continued opposition to reduction of the German obligation, eventually consented to the inquiry. The Reparation Commission voted (Nov. 23, 1923) to appoint two committees of experts, one to inquire into means of balancing the German budget and of stabilizing German currency, and the other to examine and report on the extent and methods of the export of German capital to avoid reparation payments. On December 27, the personnel of the committees was announced, the first comprising 10 members, including Brigadier-General Dawes and Owen D. Young, prominent American financiers and businessmen, and the second five members including H. M. Robinson, an American banker. All the experts were men of large experience in the fields of

public or private finance. The first committee met at Paris on January 14, with General Dawes as its chairman, and the second on January 21, with Reginald McKenna of Great Britain as president.

After three months of exhaustive investigation and deliberation, the Dawes Committee made a unanimous report to the Reparation Commission on Apr. 9, 1924. In essence this report provided: (1) Germany must meet to the full extent of its capacity its external obligations as imposed by the Treaty of Versailles; (2) the payments should be made on a sliding scale beginning with 1,000,000,000 gold marks for the first year, to be increased after four years to 2,500,000,000 gold marks annually; (3) these charges should be defrayed from taxation, the railways, and industrial debentures, and a mortgage for this purpose should be placed on the industries of the country; (4) an index of prosperity should be devised and utilized, as more reliable than an index of export statistics in determining Germany's ability to pay more than 2,500,000,000 gold marks annually after the first five years; (5) a foreign loan of 800,000,000 gold marks should be obtained, so as to satisfy the requirements of the gold reserve and to aid in the payment of immediate obligations; (6) a bank of issue should be created to promote the stabilization of German currency, as a fundamental economic prerequisite; (7) an international organization of control should be set up, to consist of a trustee for railway and industrial bonds, three commissioners of railways, the bank, and revenues, and an agent in charge of the actual payment of reparation; and (8) France and Belgium should relinquish economic control of the occupied territories. The McKenna report (Apr. 5, 1924) estimated that 6,750,000,000 gold marks had been exported from Germany and pointed out that the total foreign money lost through investment in German marks equaled the total sum of reparation cash payments made by Germany to date. The expert's reports elicited widespread commendation in Allied and neutral countries and in Germany, although some complaint was made that the Dawes committee had not been able to fix the total of German obligations. The Reparation Commission on April 11 approved the reports as offering a practical basis for rapid solution of the reparations problem, and by the middle of April the several Allied governments as well as Germany accepted them in principle. The Germans announced, however, that the evacuation of the Ruhr was indispensable for Germany's complete coöperation. The French, just recovering from a serious financial crisis due to the fall of the franc (see FRANCE), expressed satisfaction with the Dawes plan though reviving the old question of guarantees.

The situation was somewhat clarified by the outcome of the Franco-German elections of early May. In Germany, parties pledged to acceptance of the plan won a majority in the Reichstag, although not the two-thirds required for the alienation of control over the national railway system contemplated by Dawes and his associates. In France Premier Poincaré's *bloc nationale* was defeated, and in June the Radical Socialist leader, Edouard Herriot, became Premier. He immediately relaxed the coercive control over the Ruhr and permitted the return of some hundreds of thousands of German exiles. During June and early July he coöperated cordially with Ramsay Macdonald, the Labor Premier of Great Britain, in endeavoring to ensure Entente solidarity in putting the Dawes plan into operation. A new Allied conference on reparations, the first since January, 1923, was called to meet in London on July 16, 1924. The Republican administration in the United States, gratified by the report of the Dawes committee, promised to send a representative—a long-hoped-for act of cooperation in the economic rehabilitation of Europe. Equally auspicious was the nomination of General Dawes as the vice presidential candidate on the Republican ticket. Preliminary conversations between Herriot and Macdonald, however, while producing cordial personal relations, revealed in all their grim significance the time-honored obstacles to a complete and harmonious settlement; namely, French insistence on adequate sanctions and security and full payment, together with opposition to any British attempt to supersede the Reparation Commission by any other international agency

The London Conference lasted from July 16 to Aug. 16, 1924. Ten countries were represented: the British Empire, France, Italy, Japan, the United States, Belgium, Portugal, Greece, Rumania, and Jugo-Slavia. Among the prominent personages who participated in the deliberations were Prime Minister Macdonald of Great Britain as presiding officer, Premier Herriot of France, Premier Theunis of Belgium, Frank B. Kellogg, the American Ambassador to Great Britain, and later on, Chancellor Marx and Foreign Minister Stresemann of the German Reich.

In its initial stages the Conference was confined to the endeavor of the Allied delegations to agree on a common programme before negotiating with the Germans. Three committees were constituted, the first to deal with the matter of German defaults in reparations payments and the sanctions to be applied in cases of willful defaults, the second to prepare recommendations on the restoration of German fiscal and economic unity as postulated by the Dawes Committee, and the third to perfect arrangements regarding the transfer of payments from the receiving agency in Berlin to creditor countries. Premier Herriot and his French associates, in compliance with pledges previously exacted by ex-Premier Poincaré not to surrender any French rights under the Treaty of Versailles or to relinquish control of the Ruhr, accepted in principle the view that it was unnecessary if not impossible to define exactly the penalties to be imposed on Germany in contingencies such as that which preceded the occupation of the Ruhr, and it was undoubtedly as a concession to these French susceptibilities that on July 19, Committee One unanimously agreed that all rights enjoyed by nations under the Treaty of Versailles were to be preserved intact. At the same time it was further unanimously agreed that investors in the projected loan of 800,000,000 gold marks to Germany were to be guaranteed a prior lien on German resources in event of willful German default. The decision as to whether any default was willful or not was to rest with the original Reparation Commission, but it was obligated to consult the new Agent General of Reparations.

A grave crisis immediately developed regarding the loan formula. This deadlocked proceedings for a week, severely strained the Conference atmosphere, and threatened to disrupt negotiations altogether. The American and British bankers who were depended on to underwrite the

loan objected that the potential application of sanctions by one or more powers, acting not in consonance with all the other Allies but separately, would seriously jeopardize the interests of investors and render the floating of a large loan virtually impossible. Nevertheless, there was a strong resurgence of extreme French nationalism in the Paris press and political circles of opposition, where bitter criticism was leveled at Anglo-American financiers, and there was also manifest tension at London between British and French delegates Matters were smoothed over by the friendly intervention of the American representatives A less unyielding attitude was adopted by the naturally conciliatory Herriot. He and his colleagues busied themselves in devising a formula which would safeguard vital French interests at the same time that it would satisfy the demands of the bankers for reasonable safety for their investments. In response to friendly but firm pressure by Macdonald, Herriot decided to defy Poincaré and to consider an early evacuation of the Ruhr. Several critical days elapsed before a gradually evolved French plan for a special arbitration committee to decide on defaults, together with an offer to withdraw completely from the Ruhr within two years, gained ground in the Conference despite the reluctance of the British. On August 1 the deadlock was broken when Committee One accepted Herriot's arbitral scheme, and on August 2 full accord was reached by the Conference on all outstanding points

The second phase of the Conference opened on August 5 when the report as adopted in plenary session was placed in the hands of Marx and Stresemann, the German representatives dispatched to London. The German chancellor praised the Dawes Report and expressed the desire of his government to carry out its provisions in good faith. He emphasized Germany's concern on two points, first, the complete economic evacuation of the Ruhr; and secondly, the early abandonment of French military occupation of the region. On August 7 the Germans accepted the Allied default arrangement without amendment. On August 8 Herriot left for Paris, where at a ministerial council (August 10) he secured the approval of his colleagues for his actions and an authorization from President Doumergue and Marshal Foch to settle the Ruhr occupation solely with regard to reparations, thereby temporarily subordinating the question of security. The French simultaneously declared in favor of disarmament control over Germany by the League of Nations. Meanwhile affairs progressed rapidly at London, through a promising spirit of mutual conciliation and coöperation. On August 10, the Reparation Commission sitting at London and the German representatives signed a protocol for setting the Dawes Report into operation, and on August 16 a general protocol with four annexes was adopted incorporating this and all other agreements of the Conference. This protocol was to become valid only when the representatives of the states participating in the Conference should signify the formal assent of their governments and affix their signatures in London on August 31.

Briefly, the agreements were as follows: Germany was to promulgate and enforce the laws required to carry out the Dawes Report, especially those provisions relating to the bank, railways, and industrial debentures, and to apply certain provisions regarding the control of the revenues assigned as security for the annuities. The Reparation Commission on its part undertook to help execute the recommendations of the Dawes Report, especially in the way of facilitating the projected loan and making an accounting of necessary adjustments. Disagreements between the German government and the Reparation Commission as to the interpretation of this agreement and of the German legislation involved were to be resolved by a special committee of three arbitrators appointed one each by the Commission and the government, and a third, an American as presiding officer, to be appointed by joint action, or, failing agreement, by the President of the Permanent Court of International Justice. Germany further agreed to facilitate in all ways possible the making of deliveries contemplated under either the Treaty of Versailles or the Dawes Report, the programme of such deliveries, in case of non-agreement either between members of the Reparation Commission or between the Reparation Commission acting unanimously and the German government, was to be determined by a committee of three independent and impartial arbitrators, whose chairman should be an American citizen. A mixed committee of Allied and German representatives was to determine procedure for deliveries in kind. Differences in opinion between the German government and the Transfer Committee contemplated under the Dawes Report were to be settled by reference to an arbitrator chosen by the President of the Court of International Justice. Provision was made for dealing with "concerted financial manœuvres." Technical improvements in reparations proceedings might be made through submission of any disputed points to an impartial arbitral committee. The Allied governments engaged with Germany to assist in the speedy restoration of a large measure of Germany's fiscal and economic unity. The French were to evacuate the Ruhr completely within one year. Furthermore, "in order to bring about mutual conciliation and in order to wipe out the past to the utmost extent possible," the Allied governments and the German government exchanged reciprocal assurances of general amnesty for nationals having committed political offenses in the occupied territory since Jan. 11, 1923. Such modifications in Annex II of the Treaty of Versailles as were made necessary by the Dawes Report and the London Compact were specifically sanctioned by an inter-Allied agreement constituting Annex IV of the London Protocol. The Allied governments agreed to safeguard specific securities pledged to the service of the 800,000,000 gold marks loan and granted investors a prior claim on any resources of Germany, subject to a general charge in favor of the loan.

The London Conference was undoubtedly a success. It was made so by the supervention of economic realities hitherto obfuscated by political vagaries and extravagances, and it was also helped along by the astute but frank diplomacy of the liberal-minded Premiers Macdonald and Herriot, by the friendly counsel of American representatives, and by a sympathetic attitude on the part of the German delegates. The vital issue of security for France, temporarily subordinated at London, was to receive attention at the coming September meeting of the League of Nations Assembly. The question of inter-Allied debts, so inextricably intertwined with the reparations problem both historically

and in actual fact, but inflexibly debarred from discussion at London, was to be dealt with at a conference to be held in Paris in the near future, Macdonald having promised a liberal attitude in the matter.

RESEARCH COUNCIL, NATIONAL. A scientific organization established in 1916 by the National Academy of Sciences at the request of the President of the United States and continued under the charter of the Academy by an executive order of the President in 1918. Its purpose is the encouragement of research in the biological and physical sciences. It is organized in 11 divisions, four of general relations and seven covering the major fields of science and technology. The membership of these divisions is composed of representatives of more than 70 scientific and technical societies of the United States, who are in majority, together with representatives of the Federal government and a limited number of members-at-large. Since the close of the War the Council and its activities have been supported wholly by private funds, principally by the income from an appropriation of $5,000,000 made by the Carnegie Corporation of New York. Other funds have been appropriated by various agencies, including the Rockefeller Foundation, General Education Board, and many industrial corporations and individuals. Part of the appropriation from the Carnegie Corporation was used for the erection of a building for the joint use of the National Research Council and the National Academy of Sciences, located at B and 21st Streets, N.W., Washington, and completed in 1924. The Council maintains two regular series of publications: *Bulletins*, of which 46 were issued up to Sept. 1, 1924, and the *Reprint and Circular Series*, in which 55 titles had appeared up to the same date. In addition, the Council issues various miscellaneous publications. The chairman of the Council for the operating year 1923–24 was Gano Dunn; the permanent secretary, Dr. Vernon Kellogg. The same officers remained in power for 1924–25.

RESERVES, ORGANIZED. See ARMIES AND ARMY ORGANIZATION.

RESERVOIRS. See DAMS.

RESPIGHI, OTTORINO (1879–). An Italian composer, born at Bologna. He received his musical education there at the Liceo Musicale under F Sarti (violin) and G. Martucci (composition) and was professor of composition there from 1913 to 1919. He later filled a similar position at the Liceo in Rome. His works comprise the operas, *Ré Enzo* (Bologna, 1905), *Semirâma* (ib., 1910), and *Belfagor* (Milan, 1923); a puppet-play, *La Bella Dormente nel Bosco* (Rome, 1922); for orchestra, *Sinfonia Drammatica*, *Danza delle Gnomidi*, *Notturno*, *Burlesca*, and a symphonic poem, *Fontane di Roma; Concerto Gregoriano* for violin and orchestra; a piano concerto; a cantata, *Aretusa;* two string quartets; a violin sonata; and pieces for piano, for organ, and for violin. He brought out a critical edition of Monteverde's *Lamento d'Arianna*.

REUNION. An island possession of France in the Indian Ocean, 420 miles east of Madagascar. Area, 970 square miles; population (1921), 173,190, made up as follows: 167,789 of French origin, 2903 British Indians, 1052 Chinese, and several hundred Africans and Arabians. Chief towns are: St. Denis, the capital, 21,538 inhabitants; St. Pierre, 27,895; St. Paul, 19,456. Chief products continued to be sugar, rum, coffee, manioc, tapioca, vanilla, and spices. Chief exports were sugar (55,564 metric tons in 1921) and rum (875,820 gallons). The advances made by the colony may be gauged from the following trade figures: exports for 1913 and 1921, 16,592,000 francs and 78,654,500 francs; imports for same years, 24,935,000 and 71,269,555. Chief imports were food-stuffs and cotton goods. The 1922 budget balanced at 14,501,770 francs. In 1912 the figure was 5,071,980 francs.

REUTER, GABRIELE (1859–). A German novelist and essayist (see VOL. XIX). The success of her early novel, *Aus Guter Familie*, an eloquent plea for a broader life for the unmarried daughters of the German middle class, gave her a prominent rank among women writers of her country. She resided for some years in Switzerland but later returned to Berlin and published *Das Neue Land* (1916); *Die Jugend einer Idealistin* (1917); *Die Herrin* (1918); *Grossstadtmadel* (1919); and the autobiographical *Vom Kinde zum Menschen* (1921).

REVENTLOW, ERNST, COUNT (1869–). A German journalist (see VOL. XIX), who contributed largely to the war literature of his country. Among his later works were: *Der Vampyr des Festlandes* (1914); *Heucheleien Britischer Minister* (1915); *Der Einfluss der Seemacht im Grossen Kriege* (1917); *Die Politische Vorgeschichte des Grossen Krieges* (1918); and *Das Diplomatische Vorspiel des Grossen Krieges* (1920).

REVERSION. See HEREDITY.

REY, ABEL (1873–). A French professor of philosophy, born at Chalon-sur-Saône, and educated at the Sorbonne. He taught philosophy at the Lycées of Bourget and Beauvais, with the Faculty of Letters of the University of Dijon, and finally at Paris. He is best known as a philosopher of natural science and as the author of *La Théorie de la Physique chez les Physiciens Contemporains et le Mécanisme.* His other works include a manual of *Leçons de Psychologie et de Philosophie; La Philosophie Moderne;* and *Les Sciences Philosophiques, leur Etat Actuel.*

RHENÉ-BATON (1879–). A French conductor and composer, born at Courseulles-sur-Mer in Calvados Having studied piano with private teachers, he attended for two years the advanced class of C. de Bériot at the Paris Conservatoire and then studied composition as a private pupil of A. Gédalge After one year as chorus-master at the Opéra Comique he became conductor of the Concerts Populaires d'Angers, then of the Concerts Durand, and later of the Société Sainte-Cécile at Bordeaux. He directed the concerts at the Kursaal in Scheveningen in 1914–19 and in 1919 became conductor of the Concerts Pasdeloup in Paris. In 1910 he conducted a festival of French music in Munich and in 1915 a similar festival in Rome. In the spring of 1914 he was conductor of a season of Russian opera in London. His compositions include *Variations* for piano and orchestra; the orchestral works *Prélude et Fugue*, *Menuet pour Monsieur*, and *Frère du Roy;* a suite, *Fresques Antiques;* a violin sonata; and interesting piano pieces and songs. A ballet and an opera were still in manuscript and not yet produced in 1924.

RHENISH REPUBLIC. See GERMANY; RHINELAND.

RHEUMATISM, CHRONIC. Within the 10 years 1914–24, the doctrine that chronic affections of the joints, muscles, tendons, ligaments, etc., and painful affections of the nerves are most frequently due to absorption of poisonous matter from small deposits of pus in various localities attained wide diffusion and incidentally brought the physician and dentist into close relations; since in perhaps a majority of these cases the deposits of pus are believed to be of dental origin The theory, which originated largely in the United States, has also been accepted in Great Britain, but the Continent of Europe is still skeptical, the result probably of lack of communication between Europe and America during and after the War. This view has led to much upsetting of values and the extreme practice of conservative dentistry with the universal use of crowns and bridges is now largely regarded as mistaken, and has given way in turn to a movement for the extraction of all infected teeth, followed by a renewed swing towards conservatism.

No one can foresee what will be the prevalent view in the future, but in 1924 the Mayo Foundation was one of the most active advocates of extirpation of all foci of pus, however minute and at whatever cost This institution seemed also to have supplied the proof that infected teeth do cause the most serious of maladies, not only those just enumerated but a good deal of the chronic heart and kidney disease of middle life, to say nothing of ulcer of the stomach, gallstones, appendicitis, etc. Moreover, the removal of these foci does more than prevent and arrest, for in many cases men with serious organic disease appear to make a relative recovery.

It was still a mystery how so many individuals with infected teeth escape all of these diseases and some immunity must exist although it cannot be visualized The field here is far too large to be summed up as chronic rheumatism, and the term "medical sepsis" is sometimes used, which also differentiates this group of diseases from surgical sepsis. The latter is more violent, more of an immediate menace to life, and due to different forms of bacteria See also INSANITY.

RHINELAND. The French policy at the Peace Conference, as represented by Premier Clemenceau and Marshal Foch, was to make the Rhine the western frontier of Germany and either to annex the left bank of the Rhine, i e., the greater part of the Prussian Rhine Province, all of the Rhenish Palatinate, and part of Hesse-Darmstadt, or to set up this territory as a nominally independent but actually French-controlled republic, on the ground that such action was essential to the safety of France and Belgium. When this plan was wrecked by the opposition of Premier Lloyd George and President Wilson, a compromise was arranged whereby the left bank of the Rhine was to be occupied for 15 years by the Allied Powers; evacuation on the expiration of this term was to be dependent on two conditions, the complete fulfillment of the treaty by Germany, and the agreement among the Allies that "the guarantees against unprovoked aggression by Germany are considered sufficient by the Allied and Associated Powers" That these two clauses nullified the 15-year provision and left it to France's discretion to decide when the occupation should terminate has been sufficiently demonstrated by the declarations of the successive French governments from Clemenceau to Herriot that France did not consid r the 15-year provision as having begun to go into operation. Having failed to obtain security in the form of an alliance with England and the United States and having been temporarily thwarted in the attempt to separate the left bank of the Rhine from the Reich, France endeavored to attain this latter aim by means of its army of occupation. Among the divers methods employed in this direction were the consistent attempts to wear out through harsh military rule the spirit of the Rhenish people. Thus a policy of vexatious and arbitrary methods in the administration of justice was used. Whenever it suited French interests, the military authorities interfered with the civil administration by German functionaries. An economic barrier was established between the Rhineland and the Reich, and freedom of thought, of speech, and of the press was ruthlessly stamped out. In many districts white French soldiers were replaced by colored troops of occupation who were persistently reported to have committed acts of brutality against the Rhenish people. At the same time the French were accused by the Rhinelanders of conducting an energetic French propaganda by employing the educational facilities to instill the young Rhenish generation with French spirit and French culture In many respects this policy was a failure and resulted only in arousing and fanning a spirit of extreme German nationalism among the Rhinelanders, even among such persons as otherwise looked on a democratic German republic as the German ideal. The obvious contrast between the just and impartial administration of the Americans and the English in their respective areas and the arbitrary conduct of the French and Belgians created among the Rhinelanders a feeling of respect and sympathy for the Americans and the English, and all the more deepened the antagonism against the French and the Belgians In their utter helplessness the Rhenish people saw with sincere regret the final withdrawal of the Americans and the prospective leaving of the British forces.

The main effort of the French army of occupation was directed toward the creation and the fostering of a Rhenish Separatist movement. Due to the wide temperamental differences between the Rhinelanders and the Prussians in eastern Germany there had always existed in the Rhineland a certain particularistic attitude which resented the inclusion of the Rhineland in Prussia and would have welcomed Rhenish autonomy within the German Reich At no time did this attitude develop into open opposition to Prussia or did the Rhenish people harbor any thoughts of separation from Germany. It stands to reason that with the pressure of the occupation weighing on the Rhenish population and with the great gains, economic and otherwise, to be obtained from separation from Germany, there should have been elements, as in any other country under parallel conditions, which desired to break loose from the bankrupt and seemingly doomed German state. These elements, which numerically were very insignificant and whose views were regarded as treasonable and contemptible by the overwhelming majority of the Rhinelanders, were used by the French as a welcome means to undermine the connection which bound the Rhineland to the

Reich. These Separatists, as they came to be called, received thinly veiled encouragement and secret financial and other assistance from the French and Belgian armies of occupation, while at the same time they were looked at askance by the American and British forces. In the spring of 1920 the Separatists, under the leadership of Dr. Dorten, proclaimed a provisional government and a separate Rhenish republic in Wiesbaden, which belonged to the Mayence bridgehead area Notwithstanding the most active French assistance this coup d'état fell flat, chiefly because of the hostility to the movement of the Rhenish people, who had been aroused by revelations of French influence behind the Separatists. The German government was prevented from taking strong measures against the Separatists by the well-grounded fear of becoming involved in serious complications with the French; it was therefore compelled to look on while attempts were made to disrupt the unity of the Reich. The Rhenish people were left to flounder helplessly between the weakness of their own government and the machinations of the Separatists, who, although weakened by their failure, continued their activities with secret French assistance. When their meetings were upset by the loyal Rhinelanders, the French and Belgian armies went so far as to interfere openly in their favor and to assure them of military protection. With the growing helplessness of the German situation, the ever-tightening hold of the armies of occupation, the economic separation of the Rhineland from the Reich, and the dependence of the people on the armies of occupation, the fervent activities of the Separatists became bolder, and their movement grew in strength, while at the same time the Rhinelanders were discouraged, so that even people who at heart were loyal to Germany turned to Separatism in utter despair as a temporary way out of their miseries and sufferings.

The occupation and all its dismal consequences for Germany brought the Separatist movement to a head. While the French endeavored by economic pressure to reduce the inhabitants to a condition in which they would consent to the creation of an independent Rhenish state under French control, a design which came more and more to be regarded in neutral circles as the true political object of the French in western Germany, the Separatists used the Ruhr situation and the coercive French measures in the Rhineland to their best advantage and struck again. After some preludes during the early part of the year, the Rhenish Republic was again proclaimed on Oct. 21, 1923, this time in Aix-la-Chapelle When the people resisted, a struggle ensued in which the Separatists were sustained by the Belgian troops of occupation. The same occurred in a number of other places in the Rhineland and a short time later in the Palatinate. In each instance the Separatists were only able to maintain themselves because they were openly assisted by the French and Belgian troops or because the German police and the loyal inhabitants were disarmed by the troops of occupation, while the Separatists were permitted to retain their arms. In the northern sections of the Rhineland the movement collapsed quickly because the hostility of the people was too pronounced and because first the Belgians and later the French, under pressure from the British and from international public opinion, withdrew their support. The unsavory character of the Separatists, many of whom had police records or were imported foreign mercenaries, discredited the movement throughout the world and made the French and the Belgians feel ashamed of being connected with it. The movement endured longer in the southern sections of the Rhineland and in the Palatinate, but only because French connivance was more outspoken here than elsewhere. Finally the movement came to an inglorious end there also, but only after the British had intervened against Separatism. When the French thereupon withdrew their support at the end of 1923, the people of the Palatinate rose and killed a number of the Separatists in retaliation for the cruelties committed by them. In order to counteract Separatism a number of leading Rhinelanders set afoot, with permission of the central government in Berlin, a movement for an autonomous Rhineland within the Reich. Regardless of what would have been the attitude of the Rhenish people toward such a possibility in times of peace, Separatism had made them look with distrust on any change in their political status while their soil was occupied by the French and the Belgians. Thus Separatism in the last analysis had strengthened German nationalism in the Rhineland.

RHODE ISLAND. Rhode Island is the forty-eighth State in size (1248 square miles), and the thirty-eighth in population; capital, Providence. The population increased from 542,610 in 1910 to 604,397 in 1920, a gain of 11.4 per cent. The white population increased from 532,492 to 593,980; Negro, from 9529 to 10,036; native white, from 354,467 to 420,481. The foreign-born white population decreased from 179,025 to 173,499. The urban population of the State mounted from 524,654 to 589,180, while the rural decreased from 17,956 to 15,217. The growth of the principal cities was as follows: Providence (q.v.), from 224,326 in 1910 to 237,595 in 1920; Pawtucket, 51,622 to 64,248; Woonsocket, 38,125 to 43,396; Newport, 27,149 to 30,255.

Agriculture. Rhode Island, in common with most of the eastern States, showed a considerable decrease in all phases of agriculture, in the decade 1910–20. While the population increased 11.4 per cent in the decade, the number of farms decreased 22.8 per cent (from 5292 in 1910 to 4083 in 1920); the total acreage in farms decreased from 443,308 to 331,600, or 25.2 per cent; and the improved land in farms from 178,344 acres to 132,855, or 25.5 per cent. The percentage of the total land area used for agricultural purposes decreased from 64.9 in 1910 to 48 6 in 1920; the percentage of farm land improved, from 40.2 to 40.1. The total value of farm property showed an apparent increase of from $32,990,739 in 1910 to $33,636,766 in 1920, or 2 per cent; the average value per farm, from $6234 to $8238, or 32.1 per cent In interpreting these values and all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 4083 farms in 1920, 3245 were operated by owners, 205 by managers, and 633 by tenants. The corresponding figures for 1910 were 4087, 251, and 954. White farmers in 1920 numbered 4063, of whom

3123 were native and 940 were foreign-born. There were 19 Negro farmers and one Indian farmer in 1920. Farms free from mortgage in 1920 numbered 1971, compared with 2811 in 1910; those under mortgage numbered 949, compared with 1180. In 1920 there were 24,914 dairy cows, compared with 23,329 in 1910; "beef cows," 1001 compared with 2525; sheep, 2736 compared with 4206. The estimated production of the principal farm crops in 1923 was as follows: corn, 508,000 bushels; potatoes, 383,000 bushels; hay, 55,000 tons; and apples, 328,000 bushels. Comparative figures, for 1913, are: corn, 402,000 bushels; potatoes, 650,000 bushels; hay, 68,000 tons.

Manufactures. Rhode Island, although one of the smallest States in area and population, is important industrially. There were 11 cities with more than 10,000 inhabitants in 1920, and these formed 83 per cent of the total population of the State. In 1919, they reported 82.7 per cent of the value of the State's manufactured products. There were in the State 1951 manufacturing establishments in 1909; 2190 in 1914; and 2406 in 1919 Persons engaged in manufacturing numbered 122,641, 124,109, and 156,012; and the capital invested amounted to $290,901,270, $308,444,563, and $594,337,448, in those years. The value of the products, in 1909, was $280,343,797; in 1914, $279,545,873; and in 1919, $747,322,858. The increase in value of products from 1914 to 1919 was in great measure due to changes in industrial conditions brought about by the War; but the increase in average number of persons employed clearly indicates a growth in the manufacturing activities of the State. The principal industry in point of value of products is the manufacture of cotton goods. This, in 1909, was valued at $50,313,000; in 1914, at $49,719,000, and in 1919 at $177,423,000. The manufacture of woolen and worsted goods ranks second in 1909, $74,600,000; 1914, $60,889,000; and 1919, $175,312,000. The manufacture of jewelry, in third place, amounted, in 1909, to $20,685,000; in 1914 to $21,522,000; and in 1919, to $48,596,000. The principal manufacturing cities are Providence, Pawtucket and Woonsocket. In Providence, in 1909, there were 1080 manufacturing establishments, with a product valued at $120,241,000; 1207 in 1914, with $115,335,000; and 1274 in 1919, with $267,629,000. Pawtucket had 217 manufacturing establishments in 1909, with a product valued at $37,696,000; 235 in 1914, with $42,029,000; and 284 in 1919, with $135,518,000. Similar figures for Woonsocket are: 130 in 1909, with $28,210,000; 157 in 1914, with $28,115,000; and 190 in 1919, with $93,547,000. Other important manufacturing cities are Newport, Central Falls, Cranston, Cumberland, and East Providence.

Education. Educational progress in Rhode Island was constant in the decade 1913–23. The public school system includes elementary and secondary schools, established, maintained and supported by towns and cities; and two colleges, Rhode Island State College, supported by the Federal government and by the State, and Rhode Island College of Education, the principal function of which is the training of teachers. The State also provides free State scholarships for vocational courses at the Rhode Island School of Design and the Rhode Island College of Pharmacy, and for teachers' training in the Graduate Department of Education at Brown University. Rhode Island has for many years emphasized training for teachers. The Rhode Island College of Education is a model institution which hundreds of visitors from other States and countries visit annually for observation. Nearly 90 per cent of Rhode Island teachers are normal school or college graduates. In 1922–23, nearly half the teachers were enrolled in summer schools or extension courses. The State maintains or supports without contributions or assessments of any kind, a pension system for teachers, to which all employed in public education are eligible. Progress was made in the decade in the establishment of evening schools maintained by towns and cities. Vocational instruction in these schools had an intensive development, the work being very closely related to the predominant State industries. The total enrollment in public and private schools in 1914 was 117,163; in 1924 it was 129,096. The number in elementary schools had increased from 79,193 to 89 719; in high schools, from 7372 to 12,158. The percentage of illiteracy in the State decreased from 9.2 per cent in 1910 to 8.2 per cent in 1920: among the native white population from 0.9 per cent to 0.6 per cent; among the foreign-born white, from 18.1 to 17.5. Among the Negroes illiteracy increased from 11.4 to 12.5 per cent.

Finance. For finance, see STATE FINANCES.

Political and Other Events. During the decade 1914–24 the Democratic and Republican parties shared political control in Rhode Island. In 1914 R. L. Beeckman, the Republican nominee, was elected governor. The Democrats elected a Representative to Congress in one district and the Republicans in two. Charges of corruption and bribery in this election were made and investigations were carried on in 1915 by the Federal Department of Justice. For the first time in the history of the State, the United States Senator, in 1916, was elected by a direct vote of the people. The Democratic nominee, Peter G. Gerry, defeated Senator Henry F. Lippitt, Republican, who was a candidate for reelection. The Republicans, however, reelected Governor Beeckman. In the presidential voting of this year, Charles E. Hughes received 44,858 votes; President Wilson, 40,394 votes. In 1918 the Republicans were generally successful, reëlecting Governor Beeckman and Senator Le Baron B. Colt, together with the entire State ticket, as well as three Representatives in Congress. The Republicans in 1920 were again successful, electing their candidate for governor, Emery J. San Souci, and the other State officers. In the presidential voting, W. G. Harding received 107,463 votes; J. M. Cox, 55,062. In 1922 the Democrats made practically a clean sweep of State offices; the Secretary of State was the only Republican survivor. William S. Flynn, Democrat, headed the Democratic State ticket. Senator Gerry, Democrat, defeated former Governor Beeckman for the United States Senate.

Legislation. The Legislature in Rhode Island meets annually. The most important acts in the decade 1914–24 are noted below. The Legislature of 1916 authorized the organization of coöperative agricultural associations. The laws relating to taxation were amended, and so were the banking laws. In 1919 the Legislature amended the corporation franchise tax. It changed the title of the Commissioner of Industrial Statistics to the Commissioner of Labor

and made provisions for a State Board of Labor. It passed measures for protection against anarchy and incitement to violence. The workmen's compensation law of 1912 was amended and provision was made for the promotion of Americanism by the establishment of night schools, etc. In 1920 the Legislature ratified the suffrage amendment, revised the State corporation law, and authorized a bonus of $100 each for those who had served in the War. In 1921 the Legislature amended the corporation laws and the laws relating to the administration of the State, provided for vocational rehabilitation, made appropriations for the aid of discharged soldiers and sailors out of employment, disbarred women from serving on juries, increased the benefits to employees under the workmen's compensation law, adopted "blue sky" laws to prevent the sale of fraudulent securities and the promotion of wildcat stock schemes, made all women subject to the poll tax of $1 per annum. A prohibition enforcement act was passed in 1922. The Legislature of 1923 created a measure regulating the sale of coal, created a system of mothers' pensions, amended the child labor laws, and passed a measure forbidding anonymous publications of paid matter designed to defeat a candidate for office or a question to be submitted to the electors. In 1924, the Legislature, limited to 60 days' pay, had been in session for seven months, during which, because of a filibuster by Senate Democrats, no legislation was enacted The filibuster by the Democrats, who were the minority but were aided by the Democratic presiding officer, Lieut.-Gov. Felix A. Toupin, was being maintained with the aim of forcing the Republicans of both Senate and House to pass a resolution providing for submission to the people of a proposal to hold a convention to revise the State constitution.

RHODES. See DODECANESE.

RHODESIA, NORTHERN. A British African protectorate, under the administration of the British South African Company until 1924. It has an area of 291,000 square miles and an estimated native population of 928,000. Whites in 1920 numbered 3500 (in 1911, 1947) The leading activities were stock raising, cereal culture, and lead mining. Exports in 1922 were £616,083 as compared with £107,000 in 1911. Imports in 1922 were £500,321, chiefly from the United Kingdom, Southern Rhodesia, and the Union of South Africa. From the United States, imports were £32,303. In 1911 total imports were £168,000. Revenues increased from £116,000 in 1911–12 to £279,000 in 1921–22; expenditures from £190,000 to £339,000. On Apr. 1, 1924, the protectorate was taken over by the British authorities and the typical government of a crown colony established with a governor, executive council, and legislative council.

RHODESIA, SOUTHERN. A British South African protectorate, up to 1923 under the administration of the British South Africa company, but since then a self-governing colony under the British crown. It has an area of 149,000 square miles and a native population of 770,000 (in 1921). Europeans numbered 33,620 in 1921 against 2912 in 1911. Chief towns, with white populations in 1921: Salisbury (5654), Bulawayo (6830), Gwelo (1148), Umtali (1874). Minerals continued to occupy the most important place in the colony's economic scheme. The gold yield in 1923 was valued at £2,909,159. (The high point of the period was reached in 1916 with £3,895,000.) Silver in 1923 yielded £24,526; coal, £225,345; copper, £201,022; chrome ore, £302,880; asbestos, £577,699. The total 1923 mineral output was valued at £4,300,652. To the end of 1923 total mineral output was valued at £69,660,418. Agriculture flourished, with 186,246 acres under maize in 1921. Tobacco and fruit orchards were being developed. In 1920, an important dam capable of holding 4,000,000,000 gallons, was completed across the Mazoe River. Cattle raising was taken up by the Europeans during the period 1912–22 and by 1920 their herds outnumbered the native stocks. Exports in 1922 were valued at £4,627,693, as compared with £2,812,000 in 1910. The United Kingdom and South Africa were the chief countries of destination, while the United States received £572,338. Leading exports were gold, copper, asbestos, chrome ore, tobacco, live stock. Imports in 1922 were valued at £3,879,111 as compared with £2,786,000 in 1910. Most of the imports came from the United Kingdom and the Union of South Africa, while the United States sent £321,356. For administrative purposes revenues were £773,000 in 1910–11, and in 1921–22, £1,532,000. No railway building took place during 1914–24. In 1916 the lands reserved for natives were mapped out, and some 20,000,000 acres were set aside.

History. During the period 1910–22 the British South Africa Company's sovereignty was continually challenged by the white settlers The Company was compelled to enlarge the number of elective members of the Legislative Council, so that by 1922, 13 members were being elected and 6 appointed by the Company. Two bodies of opinion arose out of the War, one favoring incorporation in the Union of South Africa, and the other self-government under the crown. The latter was victorious in the general election of 1920 and was reaffirmed by the voters in a referendum held in October, 1922. Union with South Africa was rejected principally because of the ascendancy of the Dutch Nationalists in the Union, the Rhodesians fearing submergence at the hands of a non-British population. One of the leading points of contention during the period was the ownership of the unalienated lands. In 1918 possession of these lands was denied the South Africa Company, although it was admitted the Company had to be compensated for the deficits it had met in the territory's expenditures. In 1920 a commission fixed this sum at some £4,000,000 for Southern Rhodesia. In Northern Rhodesia the deficit was about £1,250,000. The Company, however, was recognized in its exclusive rights to the mineral lands On July 28, 1923, the rule of the chartered Company terminated when the Legislative Council sat for the last time and the Company's claims were settled. On Sept. 12, 1923, it was announced that Southern Rhodesia's status was that of a self-governing colony.

RHONDDA, DAVID ALFRED THOMAS, VISCOUNT (1856–1918). British colliery owner and food controller in the World War, born in Aberdare, Wales, graduated at Cambridge in 1880. Soon after leaving college he became prominent in the Welsh coal fields and also in Liberal politics. He was elected to Parliament in 1888, and remained a member for twenty-two years. His sympathy with the miners and

his extraordinary ability made him a leader in industrial circles in South Wales. Shortly after the outbreak of the War, he went to America to negotiate war contracts for the British government. In 1917, at Lloyd George's urgent request he accepted the post of Food Controller, and administered that office with conspicuous success, and was created a viscount in recognition of his services.

RHONE CANAL. See CANALS.

RICE, ELMER L. (1892–). An American playwright, born in New York City, who graduated *cum laude* from the New York Law School He wrote, among other successful plays, *On Trial* (1914); *The Iron Cross* (1917); *For the Defense* (1919); *Wake Up Jonathan,* with Hatche Hughes (1921). *It is the Law* (1922); and *The Adding Machine* (1923)

RICE INSTITUTE. An institution of the higher education at Houston, Texas, founded in 1912 The enrollment between 1914 and 1924 practically trebled, with 384 students in the former year as compared with 1050 in the latter, and a faculty of 40 as compared with 65. Eleven scholarships were endowed and a resident lectureship in civics and philanthropy established in 1918 through private support. In 1920 and 1922, similar provision was made for annual lectureships in public affairs and music The construction of a new chemistry laboratory to cost in excess of $600,000 was begun in 1923. President, Edgar Odell Lovett, Ph.D., LL.D.

RICHARDS, THEODORE WILLIAM (1868–). An American chemist (see VOL XIX) During the War he was a member of the National Research Council and served as consulting chemist to the War Department and Bureau of Mines. In recognition of his later achievements in chemistry he was awarded the Franklin medal (1916) and the Nobel prize in chemistry (1916). He became president of the American Chemical Society (1914), the American Association for the Advancement of Science (1917), and the American Academy of Arts and Sciences (1919–21).

RICHARDSON, ERNEST GLADSTONE (1874–). An American bishop, born at St. Vincent, W. I., and educated at Dickinson College and Yale University. In 1896 he was ordained to the Methodist Episcopal ministry and was a pastor of churches in Wallingford, Conn., and New York City until 1920, when he was elected bishop Bishop Richardson was trustee of Clark University and several other educational institutions

RICHARDSON, ROLAND GEORGE DWIGHT (1878–) An American mathematician, born at Dartmouth in Nova Scotia, and educated at Yale University and at Göttingen. During 1904–07 he was instructor in mathematics at Yale and then transferred to Brown, where he became professor (1915) and head of the department of mathematics. In 1918 he also served as a lecturer at the summer school of Chicago University. His specialty was mathematical analysis; he contributed results of his researches to mathematical journals.

RICHET, CHARLES (1850–). A French physiologist (see VOL XIX). Professor Richet published the following works after 1914: *War Nursing,* English translation (1918); *L'Homme Stupide* (1919); *Traité de Physiologie Médico-chirurgicale,* with Charles Richet, Jr. (1921); *Traité de Métapsychique,* an important work on the occult (1922), translated into English as *Thirty Years of Psychical Research* (1923).

RICHMOND. The capital and largest city of Virginia. The population rose from 130,833 in 1910 to 171,667 in 1920 and to 188,833 by estimate of the Bureau of the Census for Apr. 1, 1924. The city charter was changed in 1919. The mayor, instead of the bicameral council, was authorized to appoint the heads of six departments—law, finance, works, welfare, utilities, and safety—while the voters were to elect the city comptroller and city attorney. An advisory board was created. During the 10 years, a bridge 2278 feet long was built over the James River at a cost of $477,774. The fire department was reorganized and zoning regulations were adopted. Capital invested in manufacturing rose from $37,000,000 in 1914 to $97,690,000 in 1923, and the value of the output from $98,-177,000 to $250,000,000. Bank clearings increased from $420,000,000 in 1914 to $2,607,-658,000 in 1923.

RICKENBACKER, EDWARD VERNON (1890–). An American aviator, born at Columbus, Ohio. He was for many years well known as an automobile racer and won many championships. In 1917 he went to France as a member of the motor car staff of the army and in the same year was transferred to the Air Service, with which he served for a time as engineering officer. He was appointed commanding officer of the 94th Aëro Pursuit Squadron, the first American unit active on the western front, and in this service he destroyed 26 enemy planes. He was the first commanding officer to conduct his own squadron into Coblenz and at the end of the War retired with the rank of major. He received the Distinguished Service Cross, the Croix de Guerre, and other decorations. Following his military career he organized and was vice president of the Rickenbacker Motor Company. He wrote *Fighting the Flying Circus* (1919).

RICKETS. Within the 10-year period 1914–24, our knowledge of the nature of this affection has undergone many changes. To quote Dr. A. F. Hess of New York, more has been learned during this period than in the preceding 250 years We know that it may attack the well-nourished as well as the scantily fed child; and as a matter of fact the entire subject of diet is now known to be of much less significance than the absence of fresh air, sunshine and exercise. It is not too much to prophesy that complete child hygiene can eradicate the disease which flourishes in the most civilized lands, but chiefly in the industrial centres, where child hygiene is so unsatisfactory, as a result largely of the necessity of families to huddle in close quarters.

With the discovery of the fat-soluble vitamine it was hastily assumed that rickets was a deficiency disease due to the absence of this growth agent, but this view has been disproved in various ways Thus during the state of undernourishment in some of the warring states, where fats were almost lacking in the diet, there was no notable increase in rickets and, moreover, as stated, the latter sometimes develops in the well-nourished child Nevertheless it is probable that some growth agent is absent from the diet and that this absence is one of the factors in the production of rickets, but by no means the sole one. Professor McCollum has even isolated his so-called vitamine D, which he

regards as the missing growth agent, and which is quite distinct from the fat-soluble vitamine. This principle appears to be concerned in the calcium and phosphorus metabolism, the irregularity of which is responsible for rickets. With ideal child hygiene the need of a vitamine recedes to the background. These newer teachings were finding corroboration from a study of rickets in Hindus and other remote peoples and in animals The Hindu high-caste child with plenty of food but little sun and exercise develops much more rickets than the low-caste child who gets plenty of the latter but scanty food. Young puppies easily develop rickets if confined in dark barrels, even if well fed.

RIDDELL, GEORGE ALLARDICE, first BARON (1865–). An English newspaper proprietor. He acquired large newspaper properties in London and was director of George Newnes, Ltd.; C. Arthur Pearson, Ltd., and several other corporations. He represented the British press at the Paris Peace Conference in 1919–22 and at the Disarmament Conference in Washington in 1921–22. He was made a knight in 1909 and baron in 1920. He wrote *Some Things That Matter* (1922).

RIDDLE, OSCAR (1877–). An American zoölogist, born at Cincinnati, Ind., and educated at the University of Indiana and the University of Chicago. He was a teacher of biology at the Training School in San Juan, Porto Rico (1899–1901), physiology in Central High School, St. Louis (1903–05); assistant (1904–07), associate (1907–08), and instructor (1908–10) in physiology at the University of Chicago; investigator in Europe (1910–11); research associate of the Carnegie Institution (1912–15); and investigator at the Carnegie Station for Experimental Evolution (1914–). He prepared for publication the results of extended observations on the genetics of pigeons made by Professor Whitman and continued these researches especially along the line of the control of sex.

RIFLES. See SMALL ARMS.

RIGA, PEACE OF. See GALICIA; POLAND; RUSSIA; VILNA.

RINDERPEST. See PHILIPPINES, *Agriculture;* VETERINARY MEDICINE.

RINEHART, MARY ROBERTS (1876–). An American novelist (see VOL. XX). Her later stories include: *Tish* (1916); *The Altar of Freedom* (1917); *Long Live the King!* (1917); *Bab, a Sub-Deb; The Amazing Interlude* (1918); *Dangerous Days* (1919); *More Tish* (1921); and *The Breaking Point* (1922). She wrote a number of very successful plays, including *Tish* (produced in Chicago, 1919); *Bab* (New York City, 1920); *Spanish Love* (produced by Maxine Elliott, 1920) and *The Bat,* both in collaboration with Avery Hopwood (New York City, 1920); and *The Breaking Point* (1923).

RIO DE ORO. A Spanish possession and protectorate on the northwest coast of Africa. Area, approximately 109,000 square miles; population (estimate), 100,000. The population, largely Berber and nomadic, was as yet uncontrolled in 1924. Fishing was the chief economic resource.

RIPLEY, WILLIAM ZEBINA (1867–). An American economist (see VOL. XX). He was made director of the Chicago, Rock Island, and Pacific Railway (1917) and administrator of labor standards for the War Department (1918). He was chairman of the National Adjustment Commission of the United States Shipping Board (1919–20) and special examiner on consolidation of railways for the Interstate Commerce Commission (1920–22).

RIPLEY PLAN. See RAILWAYS.

RIPON COLLEGE. A coeducational, undenominational institution at Ripon, Wis., founded in 1851. The enrollment increased from 249 in 1916 to about 491 (including music) in 1924; the faculty increased from 22 to 32 members, and the library from 22,000 to 27,467 volumes. The student enrollment was limited by act of the trustees in 1923 to 500. In 1924, a campaign was started to raise $600,000; of this sum $100,000 was to pay off the indebtedness of the college, and $500,000 was to be used as a permanent endowment. President, Silas Evans, LL.D., D.D.

RISLER, EDOUARD (1873–). A French pianist, born at Baden-Baden in Germany. In 1874 his parents settled in Paris, where he studied at the Conservatory under Diémer (piano) and Chabrier (composition), taking the first prize for piano in both the elementary and the advanced class. After further study under Klindworth, Stavenhagen, and d'Albert he made a very successful début in Paris (1894). He later toured all Europe. He made his first American tour in 1923–24. In 1906 he became a member of the Conseil Supérieur of the Paris Conservatoire. He is considered one of the very greatest of contemporary pianists, a player in the grand style, withal very poetic, with a tremendous technic reverently subordinated to the requirements of artistic expression. His enormous repertoire enables him to give complete cycles of various composers' works (Beethoven, Bach, Chopin, Schumann).

RITCHIE, ALBERT CABELL (1876–). An American lawyer, born at Richmond, Va., and educated at Johns Hopkins University and in law at the University of Maryland. In 1898 he began the practice of law in Baltimore. He was city solicitor (1903–10); assistant general counsel of the Public Service Commission of Baltimore (1910–13); Attorney General of the State (1916–20), and Governor (1920–24). From 1907 to 1920 he was also professor of law at the University of Maryland Law School. During the War he served for a time as general counsel for the War Industries Board. He was the author of *Municipal Condemnation in Maryland* (1904).

RITSCHEL, WILHELM (1864–). An American marine painter (see VOL. XX). He was elected a full member of the National Academy in 1914. He won a gold medal from the National Arts Club (1914) and a gold medal from the Panama-Pacific International Exposition (1915). During the next year he was awarded the gold medal of the State Fair at Sacramento, Cal., and in 1918 the gold medal of the Philadelphia Art Club. In 1921 he won the Ranger Purchase prize from the National Academy of Design and the Isidor medal from the Salmagundi Club in 1923.

RIVERA, FERDINAND PRIMO DE, MARQUIS DE ESTELLA (1871–). A Spanish general and dictator. He served for many years in the army and was one of the most prominent members of the officers' juntas. He served for a time as Minister of War, resigning in 1917 on account of differences with the government in regard to civilian controllers in the army. He undertook to establish a National Committee of Defense whose programme was to end the war in Mo-

rocco and to institute a searching investigation into charges of corruption and incompetency in the conduct of the Moroccan campaign. He was appointed military governor of Barcelona, where he took effective steps against the syndicalists. He made effective efforts to organize the leading officers of the army, and in September, 1923, declared a dictatorship and took practical possession of the government. With the support of the King, he began extensive reforms, but his failure to carry on effectively the campaign in Morocco threatened his downfall in the latter part of 1924 See SPAIN.

RIZA KHAN (SARDAR SEPAH) (?-). A Persian public official and statesman. He was the son of a farmer and became a private soldier in the Shah's Cossack bodyguard, rising to the post of commander-in-chief of the army in February, 1921. On February 20 of that year the military forces under Riza Khan overthrew the existing ministry and set up a new cabinet. The British troops left the capital on May 16, 1921, and it was thought that the Bolsheviks would soon overrun the country. Riza Khan and his army stood in the way, and the invaders were expelled. By the end of 1922 Riza Khan was in complete control of the government and strongly supported the American finance director, Dr. Millspaugh (q v.). The Sheik of Mohommerch was induced to pay $100,000 arrears of taxes, to arrange the payment of $400,000 additional, and to promise to contribute $150,000 a year regularly Riza Khan has been called the "strong man" of Persia

ROADS AND PAVEMENTS. In the United States, the Federal Aid Road Act of 1916, the growth of automobile and motor truck traffic, and railroad conditions during and after the War combined in the interval between 1914 and 1924 to make the building of improved highways a major feature of engineering and public works construction, while more or less similar conditions in other of the civilized countries of the world had the same general effect. State highway construction, which began in a small way in Massachusetts and New Jersey in the early nineties, had by 1914 and 1915 attained large proportions in some parts of the Union. These activities were largely increased with the modest beginning and subsequent large extension of Federal aid through the appropriation of money from the United States Treasury and the large degree of assistance and control in road design and the supervision of road construction under the United States Department of Agriculture in the Bureau of Public Roads. Counties as well as States, and in much lesser degree rural towns and townships, have engaged in highway construction.

As early as 1906, New York State, by popular vote, authorized a bond issue of $50,000,000 for the construction of a State highway system and in 1912 another $50,000,000 was authorized, although the latter was in part for maintenance. In 1918, the voters of Illinois authorized a $60,000,000 bond issue to provide for a carefully laid out State system of highways In the same year, Pennsylvania provided for a $50,000,000 road bond issue. In 1919, California voted a $40,000,000 bond issue for roads, making the third issue for this purpose, with a total of $73,000,000. In 1920, Minnesota, Missouri, and West Virginia voted $75,000,000, $60,000,000, and $50,000,000, respectively. Since that date a number of other large bond issues have been voted in different States, including $60,000,000 in Arkansas in 1923. In November, 1924, Illinois will vote on an additional road bond issue, this time of $100,000,000. To a large extent the State bond issues go to meet the Federal-aid requirement that the States provide at least half the cost of roads toward which the Federal government contributes. In addition, the States must take the initiative as to routes and other planning, let and supervise contract work, and after construction maintain the roads to the satisfaction of the government or else subject themselves to denial of Federal aid in the future.

All the State work done under the Federal Aid Act is subject to the approval of the United States Bureau of Public Roads acting for the Department of Agriculture. The Federal Aid Road Act of Nov. 9, 1921, which has been the basic act for Federal aid, requires each and every State receiving Federal aid to lay out, in conjunction with agents for the Federal government, a State highway system which must be so planned as to provide for interstate connection. The Federal aid roads in each State must not exceed 7 per cent of the total highway mileage of the State and upon these roads all Federal aid apportionments must be expended. The State highway systems so laid out are divided into primary and secondary roads, the primary not to exceed three-sevenths of the total.

The act of 1921 provided that the several States must certify the mileage of their highways as of Nov 1, 1921—which proved to be a total of 2,866,061 miles. After coördination by means of conferences between the Bureau of Public Roads and groups of adjacent States, the bureau named recommended a road map of the United States to the Secretary of Agriculture This map was published Nov 1, 1923, and included 168,881 miles, which is 5.9 per cent of the mileage certified as of Nov. 9, 1921.

According to a statement submitted to a congressional committee by Thomas H. MacDonald, chief of the United States Bureau of Public Roads, up to Mar. 1, 1924, there had been completed, since the Federal Aid Road Act of 1916 went into effect, a total of 33,036 miles of road

MILEAGE AND AVERAGE COST PER MILE OF FEDERAL AID ROADS COMPLETED TO MAR. 1, 1924 [a]

Types	Miles		Average	
	Number	Per cent	Total cost Amount	Per mile Per cent
Graded and drained	6,677	20.2	$7 658	9 0
Sand clay	3,507	10.6	7 247	4,5
Gravel	13,019	39 4	9 842	22.6
Waterbound macadam	885	2.7	18,248	2 9
Bituminous macadam	1,546	4.7	30,083	8.2
Bituminous concrete	939	2.8	33,872	5 6
Portland cement concrete	5,909	17.9	38,842	40 4
Brick	505	1.5	44,242	8.9
Bridges	49	0.2		2.9
Total	33,036	100.0	190,034	100.0

[a] Figures compiled by United States Bureau of Public Roads.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

STATUS OF FEDERAL AID HIGHWAY CONSTRUCTION

AS OF
APRIL 30, 1924

STATES	FISCAL YEARS 1917–1923 Projects completed prior to July 1, 1923			FISCAL YEAR 1924 Projects completed since June 30, 1923			Projects under construction *			Projects approved for construction		
							Estimated cost	Allotted Federal aid		Estimated cost	Allotted Federal aid	
	Total cost	Federal aid	Miles	Total cost	Federal aid	Miles			Miles			Miles
Alabama	$ 3,789 011.74	$ 1,794 703.21	367.9	$ 528,287.87	$ 257 160.91	66.2	$ 13,920,506.31	$ 6 949,200.70	853.4	$ 652,035.75	$ 278,708.11	4.4
Arizona	6,518 025.52	3,195,689.68	372.1	1,194,453.52	727 736.97	104 8	2 262,520.85	1,323,211.35	173.4	825,736 07	504,607.28	45.0
Arkansas	8,623 205 72	3,308 572.12	736.2	2,318,145.05	1 045 541 62	192 3	4,256,316.15	1 732,591.09	223.7	3 515,723.24	845,234.70	215 6
California	8 495,547 60	3,538,967.90	340 5	4,145,805.72	1 962 804.58	187 0	11,613 685 98	6,111,198.17	414.7	540,834.58	379,386 15	25.3
Colorado	6,470,695.56	3,136,238 67	426 6	1,189,833 78	651,192.83	58.7	4,400,763 35	2,398,531 33	169 7	250 933 76	140.822 34	11 5
Connecticut	2,568,643 95	1,026 148 85	60 7	128,610 43	64 305 21	3 8	2,655 321 05	986,119 24	49 2	755,751 37	222,495.20	12.2
Delaware	2,196 610 22	621.154 83	45 2	718,598 97	317,815 00	22.7	988,468.80	389,767 50	27 5	76,668 90	31,961 10	0.2
Florida	69,466 31	29,700 63	15 6	604,477 52	288,175 17	23.3	8,578,162.86	4,232,785.06	255.5	1,037,874 30	440,221.40	13.7
Georgia	13,960 499.47	6,363,703.60	925 5	2,965,428 24	1,472,390.06	274.9	7,865,396 47	3,809,568 64	672.1	1,537,997.01	692,146.45	102.8
Idaho	6,880 673.73	3 272,111 01	426.1	1,141 088 96	727,522 09	74 2	1,404,050.80	826,531 30	96 2	727,191 21	408,930 73	54.0
Illinois	25,211,526 23	11,414 291 96	743.5	768,512.90	379,214 16	29 2	14,394,340 81	7,160,290 35	485 9	1,250,965.78	616,070.33	36.9
Indiana	5,513 487 76	2 668,277.55	157 0	1,945 251 03	928 993 26	64.6	12 486,232.40	6 121,359 53	411 3	2 109,233 75	1,032 191.18	81.4
Iowa	16,040,079 62	6,056,136.48	1,059.4	6,952,470 02	3,097 340 58	600.5	6 061,281 68	2,832,857 08	549 8	2,703,571 60	1,228,200 00	101.7
Kansas	12 216 428 90	4,248,438 34	349.7	4 392,131 87	1,602,266 68	129.9	16 048 072 99	5,925,834 08	549 1	2,511 965 23	1,058,678.20	115.1
Kentucky	6 620,289.80	2,789,991 15	285 0	4,081,627 63	1,768 710 23	146 9	7,316 679.52	3,535,492 32	322 1	471 726.68	235 863.33	19.0
Louisiana	7,131,394 90	3 157 128.03	590 4	1,116,208 52	367,989.39	54.2	5,682 810.05	2 729,308.82	376 8	16,405 36	8,202 68	0.2
Maine	4,662 854 19	2,242,963.03	159 8	2,248,204 59	1,056,972.35	70.9	907 304 26	451,804 19	34 8	713,577.40	354,204.36	34.0
Maryland	5 309 394 94	2,524,843 54	185 0	1,427 449 75	676,875 38	57 3	1,601 912 79	669,855 75	52 0	234,966.08	10,000.00	6.2
Massachusetts	6,841,975 16	2,802 957.88	163 7	1,967 316 05	787 062 11	40.7	5,120 287 44	1,849,601 03	96 5	782,886.11	257,589 00	12.0
Michigan	9,528,041 53	4,343,817 14	363 4	3,051,384.48	1,305,637 89	106.5	10,448 363 51	5,102,961 38	402.9	3,200,506.31	1,554,684.84	84.7
Minnesota	19,828 671.37	8,004,277 87	1,893.4	4,208,889.87	1,881,565 20	398.6	7,366,883 13	3,020 954 43	526.8	439 512.73	205,000.00	66.0
Mississippi	4 746,771 31	2,284,557 86	462.4	2,570,658 55	1 260 281 77	143 4	8 352,228 83	4 168,183 90	532 7	399 842 08	176,586 34	16 0
Missouri	5 272 757 08	2,358,848 60	365.6	5,562 471 34	2,673 920 07	383 5	14,148,945 38	6 813 519 37	618 1	1,772,165.49	821.039.81	103.3
Montana	7,935 185 30	3 896,053 50	711.5	803,232.04	420 005 19	62.0	1,832 052 67	1 287,543 63	194.1	1,236,344.25	702,460.16	140.6
Nebraska	3,159 814 47	1,449,675 04	475.6	4,210,786 91	2,014 231.26	858 5	5 854,159.94	2,824,263 01	661.1	1,951,094 47	970,367.24	182.7
Nevada	3,049 109 29	1 562,111 35	203 6	411 136,23	291 513 63	22.0	3,994 660 18	3,436,013 46	343.5	446 060 81	341,009.43	10.7
New Hampshire	2,336,997.00	1,129,004 69	140.5	739 753 19	358 862 89	30.8	591,313.98	279,768 77	21 5	265 029 38	119,644.07	7.4
New Jersey	5,423,362.96	1,975 783 52	112.1	1,794,735.56	562,527 10	29.4	8 552,430 81	2,153,320.04	49 0	1 669,599 11	538,823.99	19.1
New Mexico	4,706 909 12	2,433 663.68	617.1	599 377 33	325 186 00	97 2	4,896,222 57	3 100,904 09	583 4	1,600 613.04	1,079,939.15	104.8
New York	9,826 633 82	4,358 659 70	290.6	6,978,203 72	2,944,367 53	222.3	22 547,526 96	8,929,161.47	526 1	5,505 000.00	2,005,425.00	119 3
North Carolina	11 770 363 76	5,325,763 37	826.8	797,369.21	350,994 29	57 9	8,864,391 81	3,148,515 67	237 7	2,512,967 10	1 154 324.36	68 6
North Dakota	5 142,157 55	2,492 599 09	792.5	3,680,544 68	1 812 626 17	770 0	2 127,951 19	1 026,483 84	334.7	853,070 52	426,535.21	140.0
Ohio	22,840 050 09	7,966 325 17	662 8	9,618 128 44	3,686 542 82	281 0	11,612,728 70	4 400,022 84	315 7	2,549 123 62	862,626.05	80.5
Oklahoma	9,795 634.54	4,417 788.46	371 5	3,130 150 61	1,440 648 45	124.3	7,822,145 92	3,787,990 79	352.1	1 571 115.56	733,123.45	74.5
Oregon	10,391,362.48	4 782 736 38	534 1	1,691,510 69	1,036 357.41	121.5	2 662,216.36	1 416,202 87	144 0	138,208.95	65,675.96	17.5
Pennsylvania	33,090 029 45	12,615 058 79	652.8	3,225 176 88	1,328 845 47	68.3	7 181,910 81	2,424,402.50	126.3	11.829 122.36	3,381,970.00	216.8
Rhode Island	1,484 075 35	647,634 96	38 6	290,321 90	131,593 00	7 4	1 087 787.06	411 759 49	22 7			
South Carolina	6,181 485.41	2,885,754 37	655 1	1,826,786 06	739 184 34	247 7	6 685,566 58	2 640,586 98	503.6	647,463.82	203,684.75	46.0
South Dakota	4,758,907.24	2,320,007.33	534 5	3,579 984 08	1,767,665.78	432.6	5,221,804 03	2 681 558 80	645.9	1,066,475.00	507,154.06	110.3
Tennessee	3,210 970 94	1,535 762 18	112 5	2,064 853 17	1 019,402 48	87 6	13 827 431 86	6 724,982 26	447.6	2 099 483.57	800,842.73	62 5
Texas	29 172 501 06	11,094,069.77	2,259 6	11,347 463 51	4,293 943 98	767 3	24,943,423 31	9 911,857 22	1,548.0	4,252 173 84	1,667,637.19	251.0
Utah	2 175 007 41	1,196,437 68	116 6	1,030,357.45	627,434.33	98.9	3 399,600 07	2 101 299 95	227 3	860 682 07	635,335.20	51.4
Vermont	1,370,715 63	669,433 75	53.1	551 398 53	273 335 37	21.3	1 144,973 83	551 274 77	34 6	363 118.12	173,388.64	8.9
Virginia	6,823 978.36	3,279,029 56	402 5	2,690 547 72	1,262,704 51	134 7	8,860,281.55	4 078 223.14	325.3	551 161.37	130,773.51	18 3
Washington	10,356 980.82	4,819,105.70	419 8	618,239 13	273 551.37	35 3	2 354,076 03	1,107 800 00	97 1	1,059 358.60	474,900.00	36 2
West Virginia	4,100,225.73	1,800 932.41	206 3	1,389,522 22	564 109 12	49 3	4 740 449.70	2,084,116 50	156 8	574,510.20	260,790 10	25.1
Wisconsin	15,504,691 39	5,996 989 24	1 077 6	2.671 162 12	1.177 011 47	208 9	3,204,764 79	1 526,918 42	150 2	109,324 13	54,662.06	9.3
Wyoming	4,601,439.36	2,210,774.20	534 8	1,187,011 02	689 291 38	123.6	4,078,154 44	2,531,599 30	272.9	417.005.83	168,594.52	48.8
Totals	407,704 641.14	174,044,673.82	23 297 2	122 155,059 06	54 693 411 85	8,194 4	335 968 620.56	153,738 096 42	16 215.4	70.656 176 51	28,962,510.36	3,011 5

* Includes projects reported completed (final vouchers not yet paid) totaling: estimated cost, $49,154,309 22; Federal aid, $21,750,040.45; miles, 2,289.9.

under the Act and on the same date 13,800 miles additional were under construction and reported as 59 per cent complete. This made a total of 46,836 miles completed or being built on Mar. 1, 1924 Estimates of the mileage of improved highways built without Federal aid indicate that these roads, combined with the Federal road mileage improved or under construction, would bring the total up to 60,000 miles of surfaced roads, leaving about 110,000 miles of the Federal-State system yet to be surfaced. The total estimated cost of the mileage completed and under construction is $844,489,300, of which $372,721,900 is from the Federal aid fund The table on page 1128 shows the distribution of the 33,036 miles of road actually completed by types of surfacing and also gives the average total cost per mile for each type.

The original Federal Aid Road Act approved July 11, 1916, authorized Federal aid to the extent of $5,000,000 for the fiscal year 1917, with increases of $5,000,000 a year for the next four years, when the amount authorized was $25,000,000. The second Federal Aid Act (Feb. 28, 1919) provided an additional sum of $50,000,000 for the fiscal year 1918-19 and $75,000,000 each for the next two fiscal years, thus increasing the total authorized Federal contribution to $65,000,000 for 1918-19; $95,000,000 for 1919-20, and $100,000,000 for 1920-21. The revised programme for Federal aid, which became a law Nov. 9, 1921, provided $75,000,000 for the fiscal year 1921-22 The Federal aid programme was continued by legislation of 1922 so as to authorize Federal aid to the extent of $50,000,000 for 1922-23; $65,000,000 for 1923-24, and $75,000,000 for 1924-25. The sums authorized and actually becoming available by allotment vary materially year by year owing to a variety of conditions, the essential one of which is that the States have to meet certain conditions of the Federal Aid Road Act before money can be allotted to them by the Secretary of Agriculture under the recommendation of the Bureau of Public Roads The actual sums available for new construction, the cost of the Federal aid road work put under construction and the mileage of road built during the several fiscal years since Federal aid was established are shown by the accompanying table.

ways in the United States since 1904 was set forth in a statement by Mr. MacDonald before a congressional committee on Mar. 1, 1924. The figures available before those for the year 1921 were scanty and apparently were largely estimated. From 1904 to 1914, the "total income for all rural road purposes" increased from about $79,500,000 to $240,250,000, or 202 per cent. The earlier total includes an estimated value of about $20,000,000 in "statute labor" ("working out the road tax"). Mr. MacDonald believed that in 1914 "statute labor" was negligible, the inefficiency of this system of road construction having become generally recognized by that time. The total disbursements in 1921 for highway purposes by States, counties, townships, and districts amounted to $1,036,588,000, of which $623,346,110, or 60 per cent, were local, and $413,241,662, or 40 per cent, State contributions The total sum regardless of origin was distributed as follows: for "construction," $626,965,000, or 60 5 per cent; "maintenance," 24 per cent, and payment of principal and interest on highway bonds, 8.6 per cent. Complete data for 1922 were not available, but indicated a corresponding total expenditure of $1,011,000,000. At the beginning of 1923 the various States reported that $943,340,000 was available for highway work during the year. The figures thus far given in this paragraph do not take into account Federal aid. Taking Federal aid into account the total income for all rural road purposes from Federal, State, county, township, and district governments for the year ending Dec. 31, 1921, was $1,149,437,896, distributed as follows:

	Amount	Per cent
Bonds	$438,109,273	38 1
Federal and forest road aid	79,333,226	6.9
Motor vehicles fees $118,942,706		
gasoline tax 3,683,460	122,626,166	10.6
General property taxes	415,680,010	36 2
All other sources	93,689,221	8 2
Total	$1,149,437,896	100.0

(For distribution of Federal aid funds by States, mileage built by States under Federal aid, and many other details, see various annual reports of the United States Bureau of Public Roads.) How far the expenditures on rural roads exceed those for city streets is indicated by the fact that figures given by Mr. MacDonald show that against the $1,037,000,000 expended on rural roads during the year 1921, for streets in urban places of a population of 2500 and over that reported (2267 out of a total of 2788) there was spent slightly over $332,000,000 (presumably for construction and general maintenance) and $51,000,000 on street cleaning and lighting.

FEDERAL AID AVAILABLE, COST OF WORK UNDER CONSTRUCTION AND MILES OF ROAD BUILT [a]

Year	Available for New Construction	Put Under Construction During Fiscal Year	Miles of Road Built
July 1, 1917	$ 4,850,000		
1918	14,550,000	$ 3,144,387	13
1919	74,456,000	19,344,675	177
1920	147,261,000	81,436,032	1,493
1921	162,825,000	81,366,057	5,787
1922	154,584,000	56,777,810	10,247
1923	146,556,000	77,492,872	8,820
1924	132,438,000	91,000,000 [b]	6,500 [c]
1925	114,563,000	94,000,000 [b]	.....

[a] Official Statement by Bureau of Public Roads, Mar. 1, 1924.
[b] Estimated. [c] First 8 months of the year only.

Expenditures for Rural Highways. The immense increase in expenditures for rural high-

British Isles. The total mileage of roads and streets in England, Wales, and Scotland, ac-

cording to a "revised classification, 1923-24," is given as 177,321 in *The Empire Municipal Directory and Year Book*, 1924-25 (London). Of these 23,230 miles are listed as Class I and 14,739 miles as Class II, a distinction not defined. For England and Wales the total road mileage is 152,410, thus divided: County Council (a) main roads, 28,764 miles, and (b) district roads, 110,928, making a combined total of 139,693 miles; County Boroughs, 10,560 miles; Metropolitan Boroughs and London County Council, 2158 miles. The Scottish total of 24,911.6 miles is divided into 23,948.4 in counties and 963.2 in burghs.

Canadian Road Construction. Canada, in 1921, authorized $20,000,000 of Dominion aid to provincial road construction, available during five years. The Dominion Commissioner of Highways reported that in 1922 there had been put under construction 5786 miles of improved roads in Canada at a cost of $40,000,000 to the Dominion and provinces.

Materials and Design. The leading materials used in the construction of both rural improved road surfaces and city pavements did not change much in the interval between 1914 and 1924, but there have been marked changes in the relative extent to which the various types of pavement are employed as well as in the various elements of design, both to meet changes in burden upon road surfaces and pavements due to the shift from horsedrawn to motor vehicles, the rapidly increasing number and weights carried by the latter. A world-wide view would show that many large and important countries of the world still have practically nothing but dirt roads and rude trails. Even in the United States and some other highly civilized countries, by far the larger percentage of the total mileage of highways still remain with only the natural earth as the surface over which the vehicles pass or at best have been improved with gravel surfacing.

In the cities of the United States and many other civilized countries there is still a considerable percentage of dirt streets and much gravel or waterbound macadam surfacing, neither of these surfacings being fit to stand heavy traffic. For both rural highways and city streets where macadam is still being put down, the waterbound macadam is being superseded by bituminous-bound. Concrete in both country and city is being used more and more extensively for pavements and rural highway surfaces, with steel reinforcement under the heaviest loading in some cases. Such surfacing is used quite extensively in some parts of the country, for both rural roads and city streets, the degree of use depending considerably upon proximity to paving-brick centres of manufacture. Sheet asphalt surfacing is still in high favor for city streets in some sections of the country. For very heavy traffic city streets granite blocks are still extensively used, but their greater roughness as compared with other readily available pavements is against them. Creosoted wood-block pavement has not made the progress indicated some years ago, owing in part to difficulties experienced with swelling and heaving under some conditions and also to the increased cost of the best classes of material for wood-block pavement.

Standardization. Standardization in paving material and construction has made marked progress. Standard specifications for various kinds of paving have been framed by committees of the American Society of Municipal Improvements and adopted by the society on letter ballot. Through the coöperation of the United States Department of Commerce, road and paving engineers and manufacturers of the varieties of paving brick were reduced from 66 to 7 in 1922, then to 6 in 1923 and to 5 early in 1924. Likewise grades of asphalt, used for paving, were reduced in number from 88 to 9 in 1923, as based on the penetration test used to show relative hardness.

Cleaning and Snow Removal. For machine cleaning of streets, motor-driven vehicles with or without pick-up attachments are increasing in degree of use. Hand cleaning is still considered to have material advantages but lessens in importance with the diminishing extent of use of horses. Snow removal both from city streets and from long stretches of rural highway is becoming increasingly common to meet the demands of motor-vehicle traffic. Snow plows and sweepers are employed, together with mechanical means of loading the snow into motor or other vehicles for being carted away.

Bibliography. Recent new books or revised editions of important old ones include: Harper and Bonney, *Handbook for Highway Engineers* (New York); Blanchard, *American Highway Engineers' Handbook* (New York); Harger, *Location, Grading and Drainage of Highways* and also *Rural Highways* (New York); Agg, *Construction of Roads and Pavements* and also *American Rural Highways* (New York); Baker, *Roads and Pavements* (New York); Boulnois, *Modern Roads* (London); Besson, *City Pavements* (New York); Chatburn, *Highways and Highway Transportation* (New York); White, *Motor Transportation of Merchandise and Passengers* (New York); Holt, *The Bureau of Public Roads* (Washington), No. 26 of *Service Monographs* of the United States government. See also CITY PLANNING.

ROBERTS, KENNETH LEWIS (1885-). An American writer, born at Kennebunk, Me., and educated at Cornell University. From 1909 to 1917 he was a reporter and special writer on the Boston *Post*. In 1915-18 he was a member of the staff of *Life* (New York). In the War he served as captain of the Intelligence Section of the Siberian Expeditionary Force and from 1919 to 1921 was foreign correspondent in Central Europe and the Balkans for the *Saturday Evening Post*, and Washington correspondent for the same magazine from 1921. He wrote *Europe's Morning After* (1921); *Why Europe Leaves Home* (1922); and other books.

ROBERTSON, SIR WILLIAM ROBERT (1860-). A British soldier. He was quartermaster-general at the outbreak of the great War and in that office did efficient service in outfitting troops sent to France. In 1915 he was appointed Chief of the General Staff of the British Expeditionary Force and from 1915 to 1918 was Chief of the Imperial General Staff. In February, 1919, he was appointed to the eastern command and became general officer in June of that year, with command of troops in Great Britain. In 1919-20 he commanded the Rhine Army in Germany. He was created a baronet in 1919 and became a field-marshal in 1920. He received many decorations and honors. In 1922 he published a volume of reminiscences.

ROBIN, LÉON (1866-). A French

philosopher and classical scholar, born at Nantes, and educated at the Sorbonne. He taught at the Collège de Compiègne and the Lycées of Vendôme and Angers and was made professor at the Sorbonne in 1918. His first publication on the Platonic theory of ideas and numbers, according to Aristotelian sources, gave him an international reputation. His other works include *La Théorie Platonicienne de l'Amour* (1908) and *Etude sur la Signifiance et sur la Place de la Physique dans la Philosophie de Platon* (1919). He was also the author of studies published in the *Revue Philosophique*, the *Revue de Métaphysique* and the *Revue des Etudes Grecques*.

ROBINS, RAYMOND (1873–). An American social economist (see VOL. XX) In 1916 he was chairman of the Progressive National Convention and also leader of the national Christian evangelistic social campaign in American universities and colleges (1915–16). He was Commander of the Red Cross Mission to Russia in 1917 and 1918.

ROBINSON, EDWIN ARLINGTON (1869–). An American poet (see VOL XX). He continued to produce poetry of high merit during the decade 1914–24. His later books include two plays, *Van Zorn* (1914) and *The Porcupine* (1915). He wrote also *The Man Against the Sky*, poems (1915); *Launcelot*, a poem (1920); *The Three Taverns*, poems (1920); *Avon's Harvest*, poems (1921); and *Collected Poems* (1921)

ROBINSON, JAMES HARVEY (1863–). An American educator and author (see VOL. XX). He was professor of history at Columbia from 1895 to 1919, when he resigned to organize and lecture at the New School of Social Research in New York City From 1911 to 1920 he was associate editor of *The American Historical Review*. His later books include *Mediæval and Modern Times* (1915); and *The Mind in the Making*, (1921). The latter, a remarkable study of the development of the human intellect, contained many radical theories which caused much discussion. It was one of the most widely read nonfiction books published in many years.

ROBISON, SAMUEL SHELBURNE (1867–). An American naval officer, who graduated from the United States Naval Academy in 1888. He served during the Spanish-American War and filled many important posts on land and at sea. He was with the Bureau of Equipment in 1909–10 and with the Bureau of Steam Engineering in 1910–11. In 1917–18 he was commander of the submarine force of the Atlantic Fleet and in 1918–19 a member of the Naval Armistice Commission. In 1919 he was commandant of the Navy Yard in Boston, and from 1920 military governor of San Domingo. He was promoted to be rear-admiral in 1918.

ROBISON, WILLIAM FERRETTI (1871–). An American clergyman and educator, born at St. Louis, and educated at the University of St. Louis and at St. Stanislaus Seminary. He joined the Society of the Jesuits in 1887 and was ordained to the priesthood in 1902 He taught in several institutions and in 1906–09 was vice president of the University of Detroit. President Robison was appointed professor of ethics and natural law at St. Louis University in 1909 and became its president in 1920. Besides being the author of *Christ's Masterpiece* (1918), *His Only Son* (1918), and *The Undying Tragedy* (1919), he was widely known as a pulpit orator and lecturer.

ROCHESTER. The third city in size in New York State. The population increased 34.4 per cent from 220,087 in 1910 to 295,750 in 1920 and to 317,867 by estimate of the Bureau of the Census for 1923. Work was begun in 1922 on transforming the dry bed of the Erie Canal into a freight and passenger subway carrying trolley tracks and railroad tracks connecting lines formerly quite distinct. Eight and one-half miles of the canal were laid with track; of this, one mile in the heart of the city was covered over and a street built above it, parallel to and relieving the congestion of Main Street. The old aqueduct which formerly carried the canal over the Genesee River was reconstructed to carry both the subway and the street. The completed work was to cost about $6,000,000. A city planning bureau was created in the office of the city engineer in 1917 The superintendent in charge, who was appointed by the city engineer, had power to make a city plan, to pass on all plotting for the opening, widening, or extension of streets, and to establish building zones. In 1922, the Eastman theatre, the third largest in the United States, was built on a bequest from Mr. George Eastman, for public use under the management of the Eastman School of Music of the University of Rochester. The number of manufacturing establishments increased from 1400 in 1915 to 1700 in 1924, and the wages paid from $29,252,000 to $110,000,000. The total capital invested increased from $95,708,000 in 1915 to $200,000,000 in 1924. The customs receipts rose from $321,914 in 1914 to $786,505 in 1922. In the latter year imports were valued at $5,413,338 and exports at $8,176,443.

ROCHESTER, UNIVERSITY OF. A coeducational, nonsectarian institution at Rochester, N. Y., founded in 1850. The student enrollment increased from 531 in 1915 to 783 in the year 1923–24. The faculty increased from 45 to 69 in the same period, and the library from 66,000 to 100,000 volumes. Mr. George Eastman gave $4,500,000 to found the Eastman School of Music which was opened in 1921 with an endowment of $2,234,509. In 1921, he gave $4,000,000 to found a School of Medicine and Dentistry, and the General Education Board gave $5,000,000 for the same purpose. The school was in process of organization in 1924, and was expected to be opened to students in the fall of 1925. The university received $673,350 from the estate of L. P. Ross in 1917 to found the department of vital economics. It conducted a campaign in 1919 for $1,000,000 additional endowment to be used to cancel indebtedness contracted during the war years to the amount of $60,000, to add $100,000 to the library fund, and to increase the salaries of professors. Friends of the university proposed to conduct a campaign in 1924 to secure $10,000,000 to provide for building a new college for men on a site adjacent to the new Medical School property and to provide for $5,000,000 additional endowment. The old campus was to be used for a women's college. President, Rush Rhees, D.D., LL.D.

ROCKEFELLER, JOHN DAVISON, JR. (1874–). An American capitalist (see VOL. XX). He continued active in business and philanthropy during the decade 1914–24. As director of the Colorado Fuel and Iron Company, he encountered labor troubles in its mines. He had a careful investigation made in the in-

dustrial troubles there, and largely as a result of his efforts peace was restored. He contributed large sums of money to various causes and was especially active in church and Sunday school activities

ROCKEFELLER FOUNDATION. An organization chartered by special act of the New York Legislature on May 14, 1913. While the chartered purpose is broadly stated as "the well-being of mankind throughout the world," the work of the Foundation has become chiefly centred on public health and medical education. The expenditures during the first decade, 1913 through 1922, have amounted to $76,757,040, roughly divided as follows: public health, $18,188,838; medical education, $24,716,859; war relief, $22,298,541; all other philanthropic work, $10,445,628; administration, $1,107,174. In carrying on its various activities, the Foundation expended all its income from year to year, and in addition $17,500,000 of its general fund or principal. A further sum of $15,500,000, payable in future years, was pledged to various medical schools and public health projects. Contributions outside the field of public health and medical education were made, for the most part, during the War and in the earlier years of the Foundation's work before its policies and programme had become clearly defined. The chief item in this group is the sum of $5,678,599 given to various charities designated by the founder before he relinquished on July 19, 1917, the right which he had originally reserved to direct personally the use of a part of the income. A million dollars was given to Herbert Hoover's relief work in Europe and another million to make possible the Palisades Interstate Park.

The International Health Board, established as a department of the Foundation in 1913, sought to promote public health throughout the world by demonstrating methods and costs of controlling certain diseases, notably hookworm disease, malaria, and yellow fever; by fostering the growth of governmental health agencies; and by encouraging the formation of schools of hygiene. In carrying out this programme, the Board coöperated with 27 American States and 50 foreign governments. Its annual expenditures increased from $133,237 in 1914 to $1,842,249 in 1922. In medical education a special feature was the work of the China Medical Board, in building, equipping, and maintaining a modern medical centre in Peking. The Board made appropriations to other medical schools and to 32 hospitals, as well as to the fostering of scientific education in China. Substantial contributions were more recently made to centres of medical teaching in London and Brussels. The Foundation has also coöperated in the development of medical education in North and South America, western and central Europe, the Philippines, Hong Kong, and Bangkok. See MALARIA; YELLOW FEVER.

ROCKEFELLER INDUSTRIAL REPRESENTATION PLAN. See LABOR ARBITRATION.

ROCKFORD COLLEGE. A nonsectarian college for women, founded in 1849 at Rockford, Ill. The student enrollment increased from 242 in 1914 to 372 in 1923–24, plus 121 students in the afternoon and evening courses, the faculty was increased from 39 to 45 members, and the annual income from all sources from $109,391 to $225,000. In 1920, a system of afternoon and evening courses for non-matriculated adult students, especially teachers, was inaugurated; and in 1923, a department of religious education was established. The salaries of the instructors rose from $35,000 in 1919 to $95,000 in 1923–24. In 1923, the Hobart W. Williams Student Aid Trust Fund of $200,000 and the Beattie Student Aid Fund were received by the college. It was also engaged in raising $160,000 in 1924 to satisfy the conditions of a gift of $135,000 from the General Education Board; the completed endowment was to be $850,000. A new dormitory with swimming pool was built. William Arthur Maddox, PH.D., was inaugurated as President in 1919.

ROCKS. See GEOLOGY.

RODIN, AUGUSTE. See SCULPTURE, *France*.

RODMAN, HUGH (1859–). An American naval officer, born in Frankfort, Ky., and graduated from the United States Naval Academy in 1880. He served in the Spanish-American War and afterward performed many important services on shore and afloat. In 1916 he was appointed a member of the General Board of the Navy Department, and in the year following commanded the 3d Division of the Atlantic Fleet. In November, 1917, he was appointed commander of the 9th Division of the battleship force and with it served in the British Grand Fleet. For a year he was commander of the 6th Battle Squadron of the British Grand Fleet in the North Sea. In 1919 he was commissioned admiral and commander-in-chief of the Pacific Fleet. He received decorations and honors from several foreign governments.

ROGER-DUCASSE, JEAN-JULES (1875–). A French composer, born at Bordeaux. He studied composition under G. Fauré at the Paris Conservatoire and won the second Prix de Rome in 1902. After 1909 his works figured prominently in concerts in Paris and won favor outside of France. He is one of the neoclassicists whose works rest on the solid foundations of the classic masters, with slight impressionistic coloring. He wrote a ballet, *Orphée* (Paris, 1913); for orchestra, *Variations Plaisantes sur un Thème Grave, Suite Française, Prélude, Petite Suite, Prélude d'un Ballet, Le Joli Jeu de Furet* (scherzo), and the symphonic poems *Sarabande* (with solo voice), *Au Jardin de Marguérite* (with soli and chorus), *Nocturne de Printemps* and *Epithalame; Sur Quelques Vers de Vergile* for chorus and orchestra; a string quartet and a piano quartet; several motets; and piano pieces.

ROGERS, ROBERT WILLIAM (1864–). An American Orientalist (see VOL. XX). He was instructor at Columbia University summer sessions (1915–21) and professor at Princeton and Drew Theological Seminary. His later works are: *History and Literature of the Hebrew People* (1917); *Great Characters of the Old Testament* (1920); and *Old Testament Lessons* (1921).

ROGERS, WILL (1879–). An American actor, orator, and writer, educated at the Kemper Military School at Boonville, Mo. He made his first appearance on the stage at Keith's Union Square Theatre in New York City in 1905. His principal successes were made with the *Ziegfeld Follies*, with which he became associated in 1907. He is also well-known as an after-dinner speaker and journalist. In 1924 he covered the meetings of the Democratic national convention very cleverly for the New York *Times*.

ROHLFS, ROLAND (1892–). An American airplane pilot, born in Buffalo, N Y He was taught to fly by Victor Carlsrom. He was in charge of Curtiss Field in Buffalo for a year and experimental test pilot for four years In 1922 he held the seaplane speed record and that of climbing 20,000 feet in 10 minutes. He made many altitude flights almost equaling the world's record.

ROHRBACH, PAUL (1869–). A German writer (see VOL. XX). Among his works published in the decade 1914–24 are: *Die Geschichte der Menschheit* (1914); *Russland und Wir* (1915); *Weltpolitisches Wanderbuch* (1915); *Das Baltenbuch* (1917); *Woher Es Kam* (1919); *Politische Erziehung* (1919); *Die Beweise fur die Verantwortlichkeit der Entente am Weltkrieg* (1920); and *Gottes Herrschaft auf Erden* (1921)

ROLLAND, ROMAIN (1866–). A French writer (see VOL. XX). He received one-fourth of the Nobel Prize in literature in 1915, following the completion of his great novel, *Jean-Christophe.* During the War his pacifism, expressed in *Au-dessus de la Mêlée* (1915), incurred the displeasure of the French people, and he withdrew to Switzerland. His popularity returned after the War, and he published several novels which further increased his reputation. Other writings included articles on Gandhi, the Hindu Nationalist leader, for *The Century Magazine.*

ROLSHOVEN, JULIUS (1858) A painter and teacher, born at Detroit, and educated at Cooper Union and the Plassman Academy in New York City. He also studied with Hugo Crola at Düsseldorf Academy, with Loefftz at Munich, in Frank Duveneck's class at Florence, and in the Atelier Toney in Paris; Robert Fleury and Bouguereau were among his teachers in Paris. He founded the Rolshoven life classes in Paris and London with international attendance and was awarded honors and medals in Munich, Paris, Brussels, Chicago, Berlin, Buffalo, St Louis, and Florence "The Chioggia Fishing Girl" and two of his etchings are in the Cincinnati Museum, and "The Refectory of San Damaino, Assisi," is on exhibition at the Detroit Institute

ROMAINS, JULES ("LOUIS FARIGOULE") (1885–). A French man of letters, educated in the French universities. He became professor of rhetoric at a provincial lycée. In the meantime, under his literary pseudonym, he acquired a reputation as one of the most vigorous writers of the younger generation He accepted the label *Unanimiste* to denote the school of writing which he championed. This appellation implied an all-pervading sympathy and participation in the "collective consciousness" of the sociologists. Romains is the author of the following volumes of poetry: *Europe; Le Voyage des Amants; Amour, Couleur de Paris; Un Être en Marche; Odes et Prières; La Vie Unanime;* and *L'Armée dans la Ville.* His prose works and novels include: *Les Copains; Donogoo-Tonka, ou les Miracles de la Science; Le Bourg Régénéré; Puissances de Paris; Lucienne; Mort de Quelqu'une;* and *Sous les Quais de la Villette.* In addition he wrote two plays, *Cromedeyre-le-Vieil,* and *M. Le Trouhadec Saisi par la Débauche.*

ROMAN CATHOLIC CHURCH. Three Popes reigned in the decade 1914–24. The gentle, spiritual, peasant pontiff, Joseph Sarto, whose aim was "to restore all things in Christ," died of a broken heart in August, 1914, when the War brought international chaos. Giacomo Della Chiesa, "the Peacemaker," was elected his successor on Sept. 3, 1914; he combined the grace of his predecessor with the statesmanship of the great Leo XIII and adopted the ideals and policies of both Almost immediately he began a series of encyclicals and appeals to the warring powers to end their strife, and during the seven years of his administration he never relaxed his efforts to restore peace and concord among the nations. His Christmas address to the cardinals in 1921 on the five great social plagues of the world gained immediate and universal attention and praise. His success in renewing diplomatic relations between the Vatican and England, France, Holland, Portugal, Poland, Finland, Luxemburg, Serbia, and Monaco, and the advances for the healing of the breach between the Eastern and Western Churches were notable. The internal affairs of the Church received his constant attention. Among the special results were the promulgation of the new Code of Canon Law (June 28, 1917) and the encyclicals on preaching; True Family Life; the Bible; Dante; and Social Welfare Work. The revocation of the rule in regard to visits of foreign officials to the Quirinal, which was followed by the ceremonial calls at the Vatican of the rulers of Spain and England (1923) and President Wilson (Jan. 4, 1919); the promotion of the canonization of Joan of Arc, Louise de Gras, Margaret Mary Alocoque, Gabrielle dell' Addolorata, Oliver Plunkett, and others of the beatified; and measures for the reorganization of the demoralized church in Poland, Austria, Germany, and Russia, and the missions of the Far East were other accomplishments. His official acts followed each other so swiftly that their full influence and significance were barely appreciated when he died on Jan. 21, 1922.

The American cardinals were too late to vote at the conclave that elected Cardinal Achile Ratti his successor as Pius XI. Cardinal Farley by accident was in Europe when Benedict XV was elected and so was the only American cardinal who ever voted for a Pope. This, however, will not happen again, for by order of Pius XI, the time limit for the opening of the conclave has been extended to 15 days to enable the foreign cardinals to arrive in Rome. The new Pope, understanding English and having intimate family and social connections with America, and having lived in England and acted as a diplomat in central Europe, was especially well equipped to take up the renewed appeal for a peaceful adjustment of the discord of the nations on a basis of justice, not force. His wide experience as a student and critical historian was frequently shown in his discourses and encyclicals, notably those on St. Francis de Sales (Jan. 30, 1923); St. Thomas (June 29); St. Bernard, (August 20); St. Columbanus (August 4); Sœur Thérèse, "the Little Flower" (February 11); the Jesuit Robert Bellarmine (May 19); and the letter of thanks to the American hierarchy (September 8) for their aid to the Papal Relief Expedition to Russia. This expedition he put in charge of the American Jesuit, the Rev. Edmund A. Walsh, Regent of the School of Foreign Service at Georgetown University. It distributed more than $1,000,000 until its operations ceased because of the attempt of the

Bolsheviks to use it to force the Vatican to recognize the Soviet government (November 1923). Pius XI took occasion on November 14 and Dec., 10, 1923, to reaffirm his great interest in the reconciliation of the churches of the Eastern rites, and officially announced a projected reopening of the Vatican Council of 1869 and that the Holy Year would be proclaimed on Dec. 30, 1924, as the twenty-second general jubilee. The year closed with the encyclical permitting the acquiescence of the French Episcopate in the new association laws which make the position of the church in France more stable in the eyes of the law and therefore more satisfactory.

In August, 1917, the Catholic hierarchy organized the National Catholic War Council to promote the spiritual and material welfare of Catholics in the service of the government and to direct and assist all Catholic activities incidental to the War. It coördinated the efforts of 9714 Catholic men's and 4959 Catholic women's organizations for this purpose. When hostilities ceased, this body was continued as the National Catholic Welfare Council, at a meeting of the hierarchy held on Sept. 24–25, 1919, from which was issued a pastoral letter setting forth the problems of necessary social reconstruction As the name chosen for the body was open to a misinterpretation in a strictly canonical sense it was changed in the following year, on advice from Rome, to the National Catholic Welfare Conference, under which title it continued its work for social action, education, immigration welfare, and the proper and advantageous solution of other industrial and economic problems affecting the Catholic population, and which are discussed at annual meetings of the bishops held in Washington. On Nov. 27, 1917, Cardinal Hayes, then bishop auxiliary of New York, was appointed by the Pope chaplain bishop of all the United States forces and so served during the War. He had under his jurisdiction, when the Armistice was signed, 1023 chaplains in active service and 500 approved in the reserve list. The Catholic quota allowed by the government was 37.8 per cent of the whole corps.

The welfare work in the camps was in the hands of the Knights of Columbus who were given funds for war service work to the amount of $43,000,000, and expended in this cause, from June 16, 1917, to Oct. 7, 1923, a total of $37,250,000. The balance was being devoted to social reconstruction work and education and care for disabled service men. The membership of the Knights of Columbus grew to 770,324, organized into 2399 separate councils (1923–24).

The Hierarchy. The official data of the Catholic hierarchy given in the *Annuario Pontifico* for January, 1924, states that there were then 65 cardinals, 8 patriarchs, 335 archbishops, 1354 bishops (of whom 480 were titulars), 18 delegates apostolic, 191 vicars apostolic, and 68 apostolic prefects. All these were of the Latin rite. Belonging to the various Oriental rites were 6 patriarchs, 22 archbishops, 49 bishops, and 6 vicars apostolic. The increases since the election of Pope Pius XI were 2 archbishoprics, 7 episcopal sees, 23 apostolic prefectures, 20 apostolic vicariates, and 1 apostolic delegation. Of the cardinals, 34 were Italians and 33 of other nationalities. Eight countries had ambassadors at the Vatican, and 26 were diplomatically represented there. In 1913 there had been only 13 so represented. Sixty cardinals died during the decade 1914–24; the list includes such familiar names as Gibbons, Farley, Falconio, Martinelli, Serafino Vannutelli, Ferrati, Van Kopp, Gotti, Netto, Amette, Ferrari, Dubourg, and Agliardi. The new creations were 49, among them Dougherty of Philadelphia, Sbaretti, Schulte, Ratti (Pope Pius XI), Dubois, Begin of Quebec, and Laurenti.

In the United States 54 new bishops were appointed, and 46 died. Five new dioceses, El Paso, Grand Island, Kearney, Lafayette, and Springfield (Ill.) were organized. The older generation of the hierarchy disappeared in the passing away of Cardinals Gibbons and Farley; Archbishops Riordan, Quigley, Spalding, Blenk, Prendergast, Keane, and Kennedy, rector of the American College; and Bishops McFaul, Chatard, Hennessy, Beaven, Foley, Harkins, McDonald, O'Gorman, Kudelka, Donahue, Burke, Gabriels, Ryan, and Byrne. Most of the new bishops were comparatively young men. A radical departure in the selection of candidates for vacant American sees was enacted by the Pope (1916). The old procedure of voting for three names at diocesan convocations was abolished; a permanent list of eligibles was to be filed in Rome every two years, made up of names submitted by the bishops of the United States of those they regard as most worthy to be their successors.

Archbishop Fumasoni-Biondi assumed the office of apostolic delegate at Washington (Mar. 6, 1923), in succession to Mgr. Bonzano, who was created a cardinal, and Archbishops Dougherty, Shaw, Mundelein, Hayes, Curley, and Daeger were added to the Metropolitans.

Statistics. *The Official Catholic Directory* for 1924 gives these statistical totals for the United States: 17 archbishops of whom 2 are cardinals (2 more cardinals have since been added); 98 bishops; 23,159 churches with 17,146 priests; 105 seminaries with 9328 students; 934 colleges and academies; 6388 parish schools, with 1,988,376 children cared for; 316 orphan asylums with 48,976 inmates; and a grand total for the Catholic population of 18,559,787.

These figures, compared with those for the year 1914, indicate a decennial increase of 2,250,477 in population; 9151 priests; 2185 churches; 900 parish schools, with 532,170 children cared for; 20 seminaries and 2558 students; 25 colleges and academies; and 32 orphanages, with 3234 inmates.

Frequent complaint was made that owing to faulty and unscientific methods of computation, this total of the Catholic population is an under estimate. Archbishop Canevin of Pittsburgh, who made an exhaustive study of the subject in 1922, contended that the total should be 22,733,254. Other authoritative statisticians who have since analyzed the table which he made out agree with him. Seventy per cent of the Catholic population is in 12 States, and the remaining 30 per cent is widely scattered over the others. There are 2230 congregations made up of non-English-speaking people.

The *Catholic Directory* for England for 1924 gives the Catholic population of the world as 324,328,408. In 1914 it was estimated as 301,172,712. The Catholics of the British Empire number 14,827,312, and the grand total for English-speaking countries is 42,856,094.



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THEODORE ROOSEVELT

RÖNTGEN RAYS. See ALBERS-SCHÖNBERG, HEINRICH ERNST.

ROOSEVELT, FRANKLIN D(ELANO) (1882–). An American lawyer and public official, born at Hyde Park, N. Y., and educated at Harvard University and the Columbia University Law School. In 1907 he was admitted to the bar. He was active in Democratic politics and a member of the State Senate in 1910 but resigned in 1913 on his appointment as Assistant Secretary of the Navy, which he held until 1920. In that year he was Democratic nominee for vice president. During the War he acted as inspector of the United States naval forces in European waters and was in charge of demobilization in Europe in 1919. Although not an active candidate in the Democratic convention of 1924, he was prominent in the proceedings of that body.

ROOSEVELT, THEODORE (1858-1919). A former President of the United States (see VOL. XX). In 1914 he conducted an exploring expedition in Brazil, where he endured many hardships. The most spectacular episode of this journey was the descent of the so-called River of Doubt, which had hitherto been practically unexplored. This river was renamed for him the Rio Teodoro. At the outbreak of the War his sympathies with the Allies were emphatically and repeatedly expressed. He strongly denounced the policy of strict neutrality laid down by President Wilson and pointed out the danger to the United States if Germany won. In 1916 he supported Charles E. Hughes for President As soon as the United States had declared war, he offered to raise a division and to lead it into France. President Wilson refused this offer on the ground that it would be inexpedient to give a civilian practically inexperienced in large military operations such an important command. All of his four sons served during the War. Theodore, Jr., with the infantry in France, rose to the rank of lieutenant-colonel. Kermit served with the British Royal Artillery in Mesopotamia until he was transferred in July, 1918, to the American artillery in France Archibald rose to the rank of captain. Quentin, the youngest, entered the Air Force and was killed in an air fight in July, 1918. After a short illness, Theodore Roosevelt died in his sleep, on Jan. 6, 1919 Following his death, many books relating to him were published. These included his letters to his children and to others and many reminiscences. He published in 1916 *A Booklover's Holiday in the Open.*

ROOSEVELT, THEODORE, JR. (1887–) An American public official, born at Oyster Bay, N. Y., the son of Theodore Roosevelt. He was educated at Harvard University. He was for several years engaged in business but at the outbreak of the War was commissioned major of the 26th Infantry, United States Army. He was promoted to be lieutenant-colonel in September, 1918. He took an active part with his regiment in campaigns in France, including the Meuse-Argonne and the St. Mihiel offensives. He received the Distinguished Service Cross and the Croix de Guerre. In 1919 he was active in the organization of the American Legion. He was elected to the New York Assembly in 1919 and served for one year. In 1921 he was appointed Assistant Secretary of the Navy.

ROOT, ELIHU (1845–). An American statesman (see VOL. XX). In 1917 he headed a special diplomatic commission sent by President Wilson to Russia. He formulated the plan for the Permanent Court of International Justice, established in 1921 He was Commissioner Plenipotentiary for the United States at the Disarmament Conference. In 1918 he became chairman of the United States Government War Savings Investment Society. His later writings include: *Addresses on International Subjects* (1916); *Addresses on Government and Citizenship* (1916); *Military and Colonial Policy of the United States* (1916); *Latin-America and the United States* (1917); *Russia and the United States* (1917); and *Miscellaneous Addresses* (1917).

ROOTS. See BOTANY.

ROPSHIN, V. ("BORIS SAVINKOV") (? –). A Russian novelist. He was formerly a Terrorist and one of the leaders of the Social-revolutionary party but afterward began a bitter fight against the Bolsheviks. He wrote two problem novels on the Terror which are interesting both in material and style They are better finished than most of the novels of that sort written during the period of the Terror. His style has been compared to that of Tolstoy. His novels include *The Pale Horse* (1909) and *What Never Happened* (1912).

ROSENAU, MILTON JOSEPH (1869–). An American physician and sanitarian, born in Philadelphia, and educated at the University of Pennsylvania and the Hygienic Institute in Berlin, the Pasteur Institute in Paris, and the Pathological Institute in Vienna. Returning, he entered the United States Public Health and Marine Hospital Service, from which he resigned in 1909 to take the chair of preventive medicine and hygiene at Harvard University. In 1911 he became director of the School of Public Health of Harvard University and the Massachusetts Institute of Technology and in 1914 was made director of the antitoxin and vaccine Laboratories of the Massachusetts State Board of Health. His principal writings comprise *Disinfection and Disinfectants* (1902) and *Preventive Medicine and Hygiene* (1913).

ROSENOW, EDWARD CARL (1875–). An American pathologist and bacteriologist, born at Alma, Wis., and educated at Rush Medical College. He became a member of the teaching body in the department of internal medicine at Rush and was made an assistant professor of medicine as well as a member of the research staff of the Institute of Infectious Diseases. These positions he left in 1914 to fill the chair of experimental bacteriology in the Mayo Foundation at Rochester, Minn. In Chicago he had played a notable rôle in the study of focal infection and especially of the selective action of bacteria in attacking certain tissues to the exclusion of others. This line of research he also followed with great success at the Mayo clinic and has made it increasingly apparent that infection from slight deposits of pus is responsible for a very large amount of chronic ailments formerly attributed to natural regressive change in the vital organs. The writings of Dr. Rosenow are scattered throughout periodical literature.

ROSE POLYTECHNIC INSTITUTE. A school of engineering, founded in 1874 at Terre Haute, Ind., opened for students in 1883. The student enrollment increased from 192 in 1914 to 253 in 1924, the faculty from 14 to 16 members, and the productive funds from $800,000 to $1,100,000. In September, 1922, the institute

moved to a site 3 miles outside the city with new buildings and greatly improved equipment in shops and laboratories President, Frank C. Wagner.

ROSS, EDWARD ALSWORTH (1866–). An American sociologist (see VOL. XX). During the decade he continued as professor of sociology at the University of Wisconsin. His later books include *The Old World in the New* (1914); *South of Panama* (1915); *Russia in Upheaval* (1918); *What is America?* (1919); *The Principles of Sociology* (1920); and *The Russian Bolshevik Revolution* (1921).

ROSS, SIR RONALD (1857–). A British physician (see VOL. XX). In 1918 Dr. Ross was knighted. His experience with malaria during the War in Europe and on the eastern front is summed up in a work which he edited, *Observations on Malaria by Medical Officers with the Army* (1919). His *Memoirs of Sir Ronald Ross* (1923) gives the entire summary of his experiences in fighting malaria.

ROSS DEPENDENCY. Following its policy of extending the power and extent of the Empire, Great Britain added an Antarctic domain, the Ross Dependency. An Order of the King in Council, of July 30, 1923, constituted the Ross Sea sector of Antarctica, as a British dependency, under the jurisdiction of the governor-general of the Dominion of New Zealand. The order states that "That part of His Majesty's Dominions in the Antarctic Seas, which comprises all the islands and territories between the 160th degree of East Longitude and the 150th degree of West Longitude which are situated south of the 60th degree of South Latitude shall be named the Ross Dependency." It further appoints the governor-general of New Zealand to be the governor of the Ross Dependency, with power to make rules and regulations, and grants and dispositions of any lands which may lawfully be granted or disposed of by His Majesty. With the Falkland Islands Dependency, Great Britain in 1924 possessed practically one-third of the Antarctic regions to the south of the 60th degree of south latitude It is to be noted that the greater part of South Victoria Land, which was the first made known through the discoveries of Wilkes and later by D'Urville, are not included in Ross Dependency. Presumably the new possession was created with a view to its utility as a breeding and hunting region of marine animals.

ROSTAND, EDMOND (1869–1920). A French dramatist and poet, born at Marseilles (see VOL. XX). During the War he devoted himself chiefly to the writing of patriotic verse. Among his volumes of verse are *Musardises* and *Le Vol de la Marseillaise.* His masterpiece in drama, *Cyrano de Bergerac,* was played with immense success in New York during 1923–24 by Walter Hampden.

ROSYTH. The chief British naval base on the North Sea. It is situated on the Firth of Forth near the city of Dunfermline, where the great bridge crosses the Firth, and is about 10 miles above Leith, the port of Edinburgh. It was begun in 1903 and was ready for use in 1914, but the development of the submarine made the outer anchorage too insecure against torpedo attack. In consequence of this, the main operating base of the Grand Fleet was transferred to Scapa Flow (q.v.), leaving Rosyth as a secondary and repairing base. On account of its greater proximity to their ordinary area of operations it was much used by the battle cruisers. The dockyards, dry docks, wet docks, etc., have been constructed on the very largest scale and are ample to take care of the Grand Fleet. The selection of the site was partly due to the fact that the proposed Mid-Scotland Canal would connect the Firth of Forth and the Clyde with all the latter's great shipbuilding works. See WAR IN EUROPE, *Naval Operations.*

ROTHERMERE, HAROLD SIDNEY HARMSWORTH, first VISCOUNT, (1868–). An English newspaper proprietor, brother of Viscount Northcliffe He was associated with the latter in his newspaper enterprises and in 1916–17 was director general of the Royal Army Cothing Department. He was Air Minister in 1917–18. He endowed a chair of English literature at Cambridge University. Following the death of his brother, he succeeded to the management of the great newspaper properties

ROVE TUNNEL. See TUNNELS.

ROWE, LEO S(TANTON) (1871–). An American economist (see VOL. XX). He was general secretary of the International High Commission (1915–17) and delegate to several Central and South American conferences. He was Assistant Secretary of the Treasury (1917–19) and chief of the Latin-American Division of the State Department in Washington (1919–20). In September, 1920, he became director general of the Pan-American Union.

ROWING. See SPORTS

ROYCE, JOSIAH (1855–1916). An American philosopher (see VOL. XX). During the early years of the War he was active in his denunciation of the German cause and delivered a ringing address after the sinking of the *Lusitania* in May, 1915. He was honored on his sixtieth birthday by a testimonial volume of philosophic essays written by his former students Of his works published after 1914, *The Hope of a Great Community* appeared during his lifetime (1915). It dealt with one of his favorite themes, community loyalty. *Lectures on Modern Idealism* was published posthumously (1919) under the editorship of Professor Lowenberg.

RUBBER. With the universal use of the motor vehicle with its pneumatic or solid rubber tires, the rubber industry has developed into one of the important manufacturing activities of the United States, which by 1922, so far as its product was concerned, exceeded the rubber manufacturing industries of all other countries in the world combined, and consumed nearly 75 per cent of the world's crude rubber production in that year. With 80 per cent of the world's motor vehicles in the United States, it was inevitable that the United States should occupy a leading position in rubber manufacturing, and when to this is added the production of rubber footwear as well as rubber hose and packing, it can be appreciated how important the American industry really is. Germany, England and France were said to exceed the United States in the manufacture of bicycle tires, and while England produces more waterproof fabric she comes second to the United States in the production of rubber hose and packing.

The world's production and consumption between 1910 and 1920 had increased roughly from 70,500 tons to about 350,000 tons in 1920. There was overproduction in that year, so that in 1921 there was a decline in the output and the lowest prices since 1913 were recorded. Low

prices due to overproduction continued notwithstanding the increased consumption in the United States, and it was realized that many of the plantations were either operating at a loss or their future was seriously threatened.

In view of this situation an important event in the world rubber industry was the coming into effect of a plan devised by Sir James Stevenson and a committee known by the name of its chairman as the Stevenson plan. This was accepted by the British government and was put into effect Nov. 1, 1922. This plan involved a restriction of production in the Far East with the object of increasing or at least stabilizing the price of crude rubber from the plantations. In 1923, British- and Dutch-owned plantations produced approximately 93½ per cent of the world's rubber, and of this somewhat more than 33 per cent was controlled by companies owned or managed in the Netherlands. Therefore for the complete success of any restriction scheme the coöperation of Dutch interests and plantations was essential. The original plan developed in 1922 by the British Colonial Office and rubber producers, provided that 60 per cent of the estimated normal crop of rubber would be exported at the minimum duty, while exports in excess of that amount would be taxed heavily, the greater the excess the heavier the tax. The normal output of each plantation was computed and each producer was allotted a certain amount over which he would be taxed. There was no restriction on production, and the producer could hoard his supply if he so desired The growers in the Dutch East Indies were urged to coöperate and to work on the same basis as the British-owned plantations of Malaya and Ceylon, but they almost unanimously declined. The first effect of the plan was an improvement in prices in which naturally the Dutch shared, and the members of the Rubber Growers' Association, the British controlling agency, believed that the plan would be effective without the cooperation of the Dutch East Indies. Naturally there were disturbances in the rubber industry of both Europe and America but these were calmed as prices soon declined. Those behind the scheme were doomed to disappointment as American buyers cut down their purchases, and prices fell below a point where it was believed they could be held by the Stevenson scheme. In the meantime the Dutch East Indies benefited, as their production and exports increased, while those of Malaya and Ceylon were cut down in accordance with the restriction plan. Thus the British Malayan exports in 1923 were about 184,000 tons as compared with 212,695 tons in 1922 and those from Ceylon about 39,000 tons as compared with 46,694 tons in 1922, but the Dutch shipped about 30,000 tons more in 1923 than in 1922, so that the Far Eastern supply was cut only about 9000 tons. Obviously such a small reduction had but little effect on prices, which fell during the year, and was not satisfactory to the advocates of restriction, who, still confident of its efficacy, continued to urge that the Dutch should join with them notwithstanding that they had made some $70,000,000 more on rubber in the year ended Oct. 31, 1923, than in the year before. The British advocates tried to persuade the Dutch not to export more than 100,000 tons in 1924 and they argued that such a restriction would be good not only for the industry but would improve the plantations by preventing the trees from deteriorating under overtapping. The Dutch claimed that they had not overtapped their trees, and that the great increase in rubber output of the Dutch colonies was accounted for not so much by larger production from the estate plantations, possibly some 5000 tons over 1922, but by an extraordinary production of wild or native rubber, which was estimated at over 22,000 tons more than in 1922. The Dutch planters also claimed that the complete cessation of tapping for some such period as three months would be more advantageous than a policy of restricting.

The United States rubber industry began to develop in a remarkable fashion about 1910 and its progress since that time has coincided with that of the motor vehicle for which it is called upon to supply tires. The United States Census of Manufactures for 1914 reported for the American rubber industry 342 establishments giving employment to an average number of 74,022 wage earners and with a production valued at $300,993,796 Of this production rubber belting accounted for $7,989,405, hose for $16,853,693, rubber boots for $12,647,934, rubber shoes for $37,858,222, and tires for $146,421,569. At that time the export business was not important, amounting to about 4 per cent of the total production, England, Germany and France occupying the export markets of the world. From 1913 to 1915, American exports of rubber manufacturers averaged about $12,500,000 annually, but with the War there was a growing demand from Europe and elsewhere for American rubber goods, so that the exports in 1919 amounted to over $53,000,000. In 1920, the rubber industry, in common with other business in the United States, experienced a decline and rubber goods were shipped abroad at an average of almost $7,000,000 monthly. This average inevitably fell, and in 1921 the monthly exports averaged about $2,500,000, though by this time Continental manufacturers were getting reestablished and France in 1921 regained her lead in the world markets for the sale of tires which the United States had taken in 1920 with 38 per cent of the total, a proportion that declined in 1921 to 25 per cent, while France increased her percentage from 27 to 40.

The further progress of the rubber manufacturing industry was indicated by the United States Census of Manufactures for 1921 and for the main divisions may be summarized as follows·

RUBBER MANUFACTURES

	No of establishments	Wage earners (Average numbers)	Value of product
Belting and hose ..	18	3,007	$ 14,880,277
Boots and shoes .	24	23,888	94,032,524
Tires and inner tubes	178	55,496	496,123,335
Rubber goods not elsewhere specified .	276	20,882	99,866,997

In 1923, the total exports of rubber from the United States were valued at $36,972,170, motor vehicle tires forming the largest item, followed by rubber boots and shoes including canvas shoes with rubber soles. The pneumatic casings for automobiles exported in 1923 totaled 1,362,745 valued at $15,293,143, the United Kingdom being the largest customer. In 1923, 96,849 solid tires valued at $2,376,280 were exported. The United States ranked second to France in the world's export trade in tires amounting to about $80,000,000. Of this amount France enjoyed

some 40 per cent, the United States 25 per cent, and Great Britain 12 per cent.

The American tire industry, which is said to account for 80 per cent of the rubber used in the United States had a year of active production, manufacturing 45,000,000 tires in 1923 representing total sales of over half a billion dollars. In 1923 there was successfully introduced the new balloon or low pressure tire (see MOTOR VEHICLES) which met with considerable favor. The cord tire, the use of which had become general, also had been improved and perfected. Likewise better and larger solid tires of rubber for motor trucks were made.

RUBIES, ARTIFICIAL. See MINERALOGY.

RUBLEE, GEORGE (1868–). An American lawyer, born at Madison, Wis., and educated at Harvard University and its law school. In 1897–98 he practiced law in Chicago, removing in the latter year to New York City. He was a member of the Federal Trade Commission (1915–16) and was appointed by President Wilson to report on the Adamson Eight-hour Law in the latter year. During the War he served as a member of the Economic Board of the Council of National Defense and as special counsel of the Treasury Department. In 1918–19 he was American delegate to the Allied Maritime Council in London.

RUDDER, FLETTNER. See NAVIGATION.

RUFFO, TITTA (1878–). An Italian dramatic baritone, born at Pisa. He studied under Persichini at the Accademia Santa Cecilia in Rome and then under Cassini in Milan. In 1898 he made his début at the Teatro Costanzi in Rome as the Herald in *Lohengrin*. It was not until the following year, in Rio de Janeiro that he had the opportunity of appearing in principal parts; his unusual gifts both as a singer and actor were quickly recognized. After his return he sang at the principal Italian opera houses and also won triumphs in Paris and Vienna. His American début as Rigoletto with the Chicago Opera Association (Nov. 4, 1912) caused a veritable sensation. He later revisited the United States several times, and always appeared with the same success, both in opera and in concert.

RUHR OCCUPATION. See REPARATIONS.

RULE OF REASON. See LAW, PROGRESS OF THE.

RUMANIA. An eastern European country, with an area of 122,282 square miles, as compared with 53,489 square miles before the War. The cession of the following provinces accounted for the increase: Bessarabia (17,146 square miles), Bukovina (4030), Transylvania (22,312), Crisana (8038), Maramuresh (6258), Bânât (11,009). The population in 1914 numbered 7,768,341; in 1920 it was 16,262,177. Of the latter, 3,348,860 lived in urban communities and 12,913,317 in rural. Cities of over 50,000 in order were: Bucharest, the capital (308,987 inhabitants in 1917), Chisinau, Czernawitz, Ismail, Jassy, Galatz, Temesvâr, Braila.

Education; Religion; Race. Elementary education, though free and compulsory, was still in a rudimentary state. In 1918–19, 5764 elementary schools with 692,986 pupils, 76 secondary schools for boys with 44,983 pupils, and 66 secondary schools for girls with 9584 pupils were reported. Besides the universities at Bucharest and Jassy, two additional were opened, at Cluj in Transylvania in 1919 (1980 students in 1920) and at Czernawitz in Bukovina in 1920. In 1918, 9,695,714 communicants belonged to the National Orthodox Church, 1,456,147 to the Greek Catholic, 1,483,929 to the Roman Catholic. Besides, there were 1,344,970 Protestants, 834,344 Jews, and 44,098 Mohammedans. Though figures were not available, a consideration of ethnographic surveys indicated that Rumania's problem of racial groups was one of great importance. There were large numbers of Magyars in Central Moldavia and East Transylvania, Saxons and Swabians in South Transylvania and the Bânât, Germans and Ruthenians in Bukovina and Bessarabia, Bulgarians and Serbs along the Danube, Bulgars, Russians, Germans, Turks, and Tatars in the Dobrudja, and Russians in Bessarabia. By the Minorities Treaty signed with the Allies in 1919, Rumania pledged herself to respect all racial, linguistic, and religious differences and to permit the establishment of churches, schools, and eleemosynary institutions. These pledges were repeated in the new constitution of 1923.

Industry. Agriculture, as in Old Rumania, was the main resource of the population of Greater Rumania. The total acreage planted to the principal cereals in 1922 was about seven-eighths as great as that in the same territories before the War; the yield was much lower. For Old Rumania alone, the average acreage under wheat, corn, barley, oats, and rye for 1911–15 was 12,586,000; in 1922, it was only 10,736,000. For Greater Rumania, the average acreage of cereal crops in pre-war years was 24,879,000; in 1922, 22,395,000; in 1923, 23,767,000. The greatest change was in the shift from the cultivation of wheat to that of barley and oats. Besides the cereals, there were 11,250 acres under tobacco in 1920 and 704,000 acres of vineyards and orchards. The depredations of the War accounted for great fallings-off in live stock. There were in Greater Rumania, in 1922, 1,802,051 horses (824,714 in Old Rumania in 1911), 5,932,210 cattle (2,666,000 in 1911), 12,872,281 sheep and goats (5,456,000 in 1911), 3,146,806 swine (1,021,465 in 1911). The export of grain, hitherto so important, was only 1,267,000 tons for Greater Rumania in 1922, as compared with 2,965,000 tons for Old Rumania in 1913. The most important mining activity was that of petroleum. In 1913, 1,885,000 metric tons were extracted; in 1922, only 1,364,000 tons. Refining was done in the country and most of the product was exported. In 1922 there were 426 wells and 1375 miles of pipe lines. Principal wells were located at Prahova, Dambovitza, Bacau, and Buzau. The wells and refineries were destroyed in 1916 to prevent their falling into the enemy's hands, but during the German occupation extensive restorations took place. Natural gas production, a new development, reached 1,500,000,000 cubic meters in 1922. Coal, salt, and other minerals were produced in small quantities. Aside from petroleum refining, grain milling, and lumbering, manufactures were little developed. Plants were devoted to textiles, leather, iron and ceramic products. In 1919, 2747 establishments employed 157,423 workers, as compared with 1149 establishments and 58,871 workers in 1915.

Trade and Communications. Trade after the War continued to languish. In 1914, imports into Old Rumania totaled $97,319,000; in 1920, imports were $138,463,000 (at exchange

rate for the year). The export trade showed the real state of affairs. In 1913 exports were valued at $129,446,000; in 1921, at $100,807,000; in 1922, at $84,763,000 (the latter two figures at exchange rates for the year) The decline was particularly prominent in the cereal and petroleum products. The only articles to gain conspicuously over the period were barley, oats, and lumber Exports to the United States, in 1913, were $146,000; 1922, $500,000, 1923, $336,440. Imports from the United States, 1913, $3,237,000; 1922, $2,436,000; 1923, $1,177,758. Nothing more graphically indicates the decline than the figures for the carrying trade. In 1912, 36,968 vessels of 10,807,213 tons entered the country's ports, in 1919, 10,546 vessels of 2,991,095 tons entered. The merchant marine in 1912 consisted of 649 vessels of 198,159 tons; in 1919 it was 158 vessels of 71,158 tons. The country's principal seaports were Constanza, Galatz, Braila In 1920 the total railway mileage was 7246, of which 60 per cent was state-owned. By the Treaty of Versailles the Danube Commission was reconstructed to consist only of representatives of Great Britain, France, Italy, and Rumania

Finance and Economic Conditions. For 1913–14 the budget balanced at 600,232,900 lei ($115,844,950); the budget for 1922–23 provided for expenditures of 10,498,000,000 lei ($85,000,000 at the rate of exchange then prevailing). Chief sources of revenue for 1922–23 were enumerated as direct taxes, 650,000,000 lei; indirect taxes and customs, 3,310,000,000; stamp taxes, 571,000,000; state monopolies, 1,626,000,000 The public debt on Oct. 1, 1913, amounted to $341,455,000; in 1922 the total foreign debt, exclusive of the share in the obligations of the Austro-Hungarian monarchy, amounted to $1,025,000,000 at par of exchange. Included in the latter were debts to the Allies and the United States aggregating $396,000,000. The internal debt consisted of obligations given to the National Bank against paper money issues. In 1923, 15,390,824,000 lei in paper currency were in circulation, as compared with 578,000,000 in 1914. The budget for 1924 was the first since the War to contain a service for the internal and external funded debts. The failure to fund a large part of the debt, and the inability of merchants to meet their foreign obligations incurred after the War and the continued currency depreciation contributed to the commercial stagnation In 1923 a temporary moratorium was declared. The exchange value of the leu for typical years was: 1914, $0.193 (par); 1920, $0.02; 1921, $0 012; May 1, 1923, $0 005. The cost of living index was· 100, Aug. 1, 1916; January, 1922, 1858, January, 1923, 2494; December, 1923, 3552. The wage index, based on 100 for 1914, was 1548 in 1922.

History. From the opening of the War to Aug. 28, 1916, Rumanian politicians watched the straws to detect the direction of the wind. Although bound to the Central Powers by a secret alliance based on traditional dread of Russian aggrandizement, Rumania refused to join her confederates when the War broke out, and during the early years of the struggle conversations were continually being carried on with Allied representatives in an attempt to strike a favorable bargain. Rumania sought expansion in all directions: to the north where the Bukovina (Austrian) lay, to the northeast for Bessarabia (Russian), to the west for Transylvania and the Bânât (Hungarian). The Teutonic successes against Russia in 1915 and the subsequent conquest of Serbia cooled the Rumanian ardor for a time, but the successful Russian offensive of the summer of 1916 against Austria, giving rise to a fear lest Russia conquer for herself Bukovina and Transylvania, together with Allied victories on the Somme and at Gorizia, and the preparations at Saloniki, strengthened the hand of the interventionists. In the summer of 1916 Rumania secretly obtained from the Allies a promise of the Bukovina (in part), Transylvania and border regions to the west, and all the Bânât (qq.v.), as the price of Rumanian intervention; the Allies further agreed to support Rumania by pressing military offensives in Galicia and Macedonia. On Aug 28, 1916, therefore, Rumania confidently declared war on Austria, and Rumanian troops enthusiastically marched through the defiles of the Transylvanian Alps to liberate their kinsmen from Hungary Then, swiftly, disaster overtook the Rumanian cause. From the south, a Bulgarian army swept into the Dobrudja to stay until the end of the War, while from the north General Falkenhayn pursued the shattered Rumanian army back across the frontier, across the Wallachian plain, and into Moldavia On Nov. 27, 1916, Bucharest, the capital, was abandoned by the King and Parliament, and Jassy was made the seat of government Wallachia was overrun, the large stores of grain captured and transported to Germany, and the oil fields operated by the invader for his own purposes. A counteroffensive was prepared for 1917, but the gradual disintegration of the Russian army deprived the Rumanians of effective Russian aid, and the defeat of Marasesti completely crushed Rumania. Some months later Rumania was compelled to accept an armistice dictated by Germany. Meanwhile internal unrest hastened a group of long-agitated reforms. Under the shadow of a complete German occupation, the parliament passed a radical agrarian law, fixing the maximum holding at 50 hectares and providing for distribution of some 2,000,000 hectares among the peasantry.

Hope based on further popular resistance was illusory, for the Rumanians were compelled to accede to a humiliating peace in March, 1918 (Treaty of Bucharest), by which they were deprived of the Dobrudja and control over the Danube, as well as the possession of their railways, wheat crops, and petroleum wells, for an indefinite period It was inevitable that the Rumanians should suffer all the tribulations of a conquered people, e g. forced labor, requisitions of foodstuffs and supplies, a constantly depreciating foreign currency, etc. The Marghiloman government, i e. the Rumanian ministry during the occupation, in its endeavor to satisfy all factions, naturally could please none. With the fall, therefore, of the Central Powers and the triumphal reëntry of the King into Bucharest on Dec. 3, 1918, the militant nationalists, flushed by a victory in which they considered themselves participants, assumed control of the government without waiting for a parliamentary mandate and took a threatening posture toward their late enemies. The annexation of Bessarabia (q.v.) was declared a *fait accompli*, an army was sent into Transylvania to support the movement for independence and union with Greater Rumania. In 1919, when food scarcity, industrial unrest, and political propaganda all threat-

ened an internal upheaval, the government attempted a diversion by sending an army into Soviet Hungary. It was feared of course that radical ideas might infect the Rumanians and that Soviet Hungary might also become aggressive. At the same time it no doubt occurred to leading Rumanians that a show of force must impress the Peace Conference, then sitting at Paris By August 3, Rumanian troops were encamped in the suburbs of Budapest. In spite of the protests and even threats of the Allies, the Rumanians entered Budapest and proceeded to confiscate foodstuffs, farm animals, tools, and rolling-stock. Not until Admiral Horthy was safely installed in Hungary as regent did the Rumanians consent to quit the country. By the peace treaties of St. Germain (Austria) and the Trianon (Hungary), the Bucharest "peace" (above) was canceled and Rumania was given sovereignty over most of Bukovina, all Transylvania, together with a strip of the Hungarian plain west of the Transylvanian uplands, and the northeastern half of the Bánát of Temesvár. The Treaty of Neuilly (Bulgaria) confirmed Rumania in possession of the Dobrudja Moreover, by a treaty signed with the Allies in October, 1920, Rumania was authorized to retain Bessarabia. A minority treaty (Dec 9, 1919) dictated by the Allies guaranteed liberal treatment of minorities in the annexed as well as in the pre-war territories of Rumania. The combined result of the peace treaties was to more than double Rumania's area and population, despite the distinctly inglorious rôle which the nation had played in the War.

The years following were concerned with the vexing internal problems of constitutional reform, the agrarian question, and the general unrest brought on by tardy reconstruction measures. Ministries fell rapidly. In 1919–20 an agrarian minorities bloc tried to form a government, but it soon gave way to the ministry of General Averescu, supported by Take Jonescu, which was strongly nationalistic in temper. The minorities in Bukovina, Transylvania, and Bessarabia, were antagonized by the dissolution of their national councils; the failure to hasten the land reform measures aroused the hostility of the peasants. Meanwhile the prisons were being filled with political prisoners. In 1921, Jonescu headed a ministry, in 1922, Jon Bratiano succeeded him. On Oct. 15, 1922, the coronation of King Ferdinand and Queen Marie as rulers of Greater Rumania was celebrated. The year marked a heightening participation of Rumania in foreign affairs. The Rumanian government renewed its adhesion to the Little Entente (q.v.), which it had formed together with Czecho-Slovakia and Jugo-Slavia in 1920, and by its firmness it forced the Russians temporarily to accede to the annexation of Bessarabia. The goings and comings of Queen Marie over Europe, and her success in marrying her daughters to the Kings of Greece and of Jugo-Slavia, gave Rumania a certain conspicuousness perhaps hardly justified by its internal condition or its potential development. The year 1923 saw no further advance toward stability. Antisemitism, that barometer of the morale of a people, was rife and led to frequent attacks on the Jews and on the government for being presumably sympathetic toward Jewish aspirations. Fascism, inspired by Italian success, seized the country with the result that 100,000 Black Shirts were soon enrolled. Even the promulgation of the National Constitution (Mar. 28, 1923), which in some senses was an advanced document, did not serve to quiet the unrest. By it, minority representation was provided and full rights of citizenship were granted to Rumanian Jews; the State claimed for itself all mineral wealth, including oil, to be found in the subsoil, as well as water-power properties, etc.; constitutional guarantees were set up for the freedom of the press and against the imposition of a censorship, for the freedom of association, public assembly, etc. The failure to satisfy the peasants by a land division, the repeal of the more liberal declarations of Bessarabia and Transylvania of 1918 which established land and electoral reforms, and the recognition of the Greek Orthodox Church as the dominant ecclesiastical body to the neglect of the Roman Catholic Magyars, resulted in the strengthening of an opposition whose character presaged future difficulties.

The year 1924 hardly saw an alleviation of Rumania's difficult position Threatened by Russia on one side, rebuffed by the Great Powers consistently, with the possibility of internal dissension hanging over the country like a black cloud, the government's deportment plainly showed its uneasy frame of mind. Russia abruptly terminated the Russo-Rumanian conference at Vienna in March because of the Bessarabian question. There was continual talk of Russian desire to establish a Moldavian republic centring in Bessarabia and including Kherson and Podolia. Whether Russia meant to attack or not, the Rumanian official attitude certainly favored preparedness, for a steady stream of munitions was proceeding from France into the country. In April and May the Rumanian royal family completed a round of visits to Paris, Brussels, and London. Rome and Madrid were, significantly enough, dropped from the itinerary at the request of Mussolini and Rivera. But the financial and diplomatic purposes behind the visits ended in flat failure: Rumania received neither promises of military aid nor the proffer of funds to relieve her economic distress. Foreign governments were further antagonized by the mining law of July, 1924, which ordered all foreign-owned corporations to sell 60 per cent of their shares in Rumania, at, of course, Rumanian prices. This was in reality interpreted as a move on the foreign oil companies, whose properties were valued at $150,000,000. To further complicate the domestic situation, protests were frequent against the virtual dictatorship of the Bratiano brothers, while the communists continued active In short, from the economic and political points of view, Rumania's situation, in spite of the country's lofty pretensions, was as critical as that of her neighbors, Bulgaria, Greece, and Hungary, whom she affected to despise. See also TRANSYLVANIA; WAR, DIPLOMACY OF THE.

RUMANIAN LITERATURE. War invaded the heart of Rumania; the flames of revolution were spreading at her very gates. The decade in Rumanian literature exhibits the scars of the tragedy. Moreover, the toll of death among the coryphei was exceedingly heavy during this period.

Prof. Paul Bujor relates the exodus of Alexandru Vlahută (1859–1920) from Wallachia, in the winter of 1916 under the fire of the enemy, in an ox cart in the midst of the unfortunate people who were fleeing from the invaders.

When kings have shared the same fate, what matter if a dreamer remained among his brethren in want and despair? Barbu Delavrancea (1858–1918), the author of *Trubadurul* and *Paraziții*, and George Cosbuc (1856–1918), the bard of the peasantry, died in this period of stress. Titu Maiorescu (1840–1917) and C. Dobrogeanu-Gherea (1855–1920), the fathers of Rumanian criticism, left almost bare this field of letters, closing with their eyelids the epoch of Mihail Eminescu (1850–1889), the greatest Rumanian poet, under whose influence the language and inspiration of the Rumanians reached the highest peaks. Of this generation survives only Ioan Slavici (born in 1848), novelist, as I. L. Caragiale (1852–1912) and Ronetti Roman (1852–1908), the pillars of the Rumanian theatre, Alexandru Macedonschi (1853–1921) and Duiliu Zamfirescu (1858–1922), the two subtle poets, have also passed on. And here we must add the early death of the most original poet after Eminescu, Dimitrie Anghel (1873–1914), delicate, penetrating, endowed with a rare colorful fantasy, lover of flowers and their magic troubadour; and the untimely deaths of P. Cerna (1877–1913), the profound; St O Iosif (1875–1913), the patriarchal; A. Steuerman-Rodion, the revolted one; B. Nemțeanu (1888–1919), intimate and sincere; Haralamb Lecca, the select; Emil Gârleanu (1878–1914), short story writer; Ilarie Chendi (1874–1913), the caustic critic. Finally, the young and promising Mihail Săulescu, poet of the undefined, I Chiru-Nanov, prose writer, and Ion Trivale, critic, who paid the tribute of Mars with their lives.

Yet from the ruins and ashes of old Rumania a new and greater Rumania arose, and, as her people were gaining more and more liberties, life and work were blooming again.

In poetry the new generation boldly rivaled its elders. Octavian Goga, born in 1881, who once sang of the downtrodden; Ion Minulescu, builder of sonorities and symbols; Ovid Densusianu, scholar and thinker, discreet and deep; Tudor Arghezi, new and daring; N. Davidescu, aristocratic but warm, Enric Furtună, to whom only Cerna can be compared; Mihail Codreanu, the suave; A. T. Stamatiad; Artur Stavri; Barbu Lăzăreanu; Adrian Verea; Leon Feraru, born in 1887, Donar Munteanu; Vasile Militaru; George Gregorian; G. Topârceanu; Corneliu Moldovanu; Eugeniu Speranța; Radu D. Rosetti, still young; Pan Halippa; A. Toma; A. Axelrad; Elena Farago; Natalia Negru; Alice Calugăru; Maria Cuntan; G. Murnu; G. V. Bacovia, the strange and secluded; O. Carp; Ion Buzdugan. The new generation has given Ion Pillat, many-hued, poet of the old manner and editor of *Antologia Toamnei;* Emil Isac, warm, dashing; Lucian Blaga; I. M. Rașcu; Dragoș Protopopescu; Eugen Relgis, passionate lover of freedom; Virgiliu Moscovici, Biblical; A. Dominic; Adrian Maniu; A. Philippide; Demostene Botez; M. Cruceanu; Em Cerbu; Emanoil Bucuță; Perspessicius; Mia Frollo; Ieronim Laurian; Ion Barbu; Camil Petrescu; Nichifor Crainic; Horia Fortună; Camil Baltazar; Claudia Millian; Alfred Moșoiu; George Vocvidca. The sway of Anghel left a deep imprint in the poetry of the later years. What characterizes it is the graceful blending of the native popular and the European.

In the short story and novel the leader was Mihail Sadoveanu (born in 1880), in whose work Moldavia, his native province, appears in all her glory. Gala Galaction is the most artistic and sophisticated. V. Demetrius and Liviu Rebreanu succeeded in the novel. Others are: Ion Agârbiceanu (born in 1882), Jean Bart-Botez, Ion Gorun, Sandu-Aldea, D D. Pătrășcanu, I. Bassarabescu, I. Brătescu-Voinesti, Victor Crăsescu, A. Cazaban, Vasile Pop, Ion Dragoslav, Hortensia Papadat-Bengescu, M. Beza, the Macedonian story teller, N. Batzaria, N. Ciotori; as well as the young Cezar Petrescu, Ionel Teodoreanu, F. Aderca, Ion Pas, Sarina Cassvan-Pas.

To the theatre contributed: A. Davila, Victor Eftimiu, whose plays are being produced in several European theatres, A. de Herz, Mihail Sorbul, Cathon Theodorian, Cora Irineu (died in 1924), B. Luca and Dr. A. Stern, the translator of Shakespeare.

In criticism Ovid Densusianu, the poet, also the editor of *Viața Nouă*, continued consistent in his principles laid down 20 years earlier. There were also: N. Iorga, the learned historian, M. Dragomirescu, Eugen Lovinescu, G. Ibrăileanu, H. Sanielevici, A. Spiru-Bacău.

Political writers of fine calibre were Dr. N. Lupu, the statesman and leader of the peasant party, Constantin Graur, Constantin Stere, Eugen Filotti, Dem. Theodorescu, S. Labin, Emil D. Fagure, B. Brănișteanu, Iosif Nădejde, Delafras, P. Mușoiu, N. D. Cocea, Tudor Theodorescu-Braniște, M. Sărățeanu, M. Schwarzfeld, M. Schweig, I. Rosenthal, H. St Streitmæn, author of *Revizuiri*

Profs. C. Rădulescu-Mortu, S. Mehedinți, I. Petrovici, Vasile Pârvan, G Vâlsan, A. Candrea, Gh. Adamescu, G. Bogdan-Duica, etc., were aiming, like almost all the writers mentioned here, at bringing Rumanian culture nearer to the western standards. Europism is the new word they coined, and its tendency was toward the overthrowing of old barriers.

RUMBOLD, Sir Horace George Montagu (1869–). A British diplomat. In 1890 he became British Attaché at The Hague. After passing a competitive examination he was appointed to Cairo in 1891, and after serving at many other places, Vienna, Madrid, Tokio, etc., he was Chargé d' Affaires at Berlin, July 1–27, 1914. On the declaration of war he left Berlin and was employed in the Foreign Office in London. He was British Minister to Switzerland from 1916 to 1919 and to the Republic of Poland in 1919–20. He was British High Commissioner at Constantinople and as deputy for Lord Curzon was head of the British delegation at the Lausanne Conference in November, 1922.

RUPPRECHT, Crown Prince of Bavaria (1869–). (See Vol. XX). He commanded the Bavarian troops which won the battles in Lorraine in August, 1914. He commanded the German front at Artois and southern Flanders, was made field marshal and given the chief command of the northern group of armies on the western front. He renounced his claim to the Bavarian throne at the time of his father's abdication in 1918, and was said to have privately stated his disapproval of the German foreign and military policy in the War.

RURAL CREDIT. See Agricultural Credit.

RUSBY, Henry Hurd (1855–). An American botanist and physician (see Vol. XX). In 1917 Professor Rusby led an exploring party to the mountains of Colombia, in a search for sources of quinine. In 1921–22 he made a sec-

ond trip, partly in the interest of identification of the so-called "courage plant."

RUSSELL, BERTRAND (ARTHUR WILLIAM) (1872–). A British philosopher (see VOL XX). During the War he was a propagandist for pacifism and was imprisoned for six months for attacking the reputation of the American army. He was also forced out from his chair at Cambridge University. He thus identified himself more and more with radical movements, and when a delegation from the British Labor party sailed to investigate conditions in Soviet Russia, he accompanied them. He came away disillusioned with communism and wrote up his dissatisfaction in *The Practice and Theory of Bolshevism* (1920). Sailing for China in 1920, Russell found amid the ruins of the Celestial Empire a greater promise of freedom than that of the Occident. In China he composed a work on *The Analysis of Mind* (1922), in which he accepted the principal tenets of behavioristic psychology. In 1924 he visited the United States as a professional lecturer. Half flatteringly, half in the manner of Cassandra, the eminent philosopher predicted the gradual enslavement of impoverished Europe to the mechanical civilization of America. In addition to the works mentioned, Russell published after 1914: *Principles of Social Reconstruction* (1917); *Mysticism and Logic* (1918); *Roads to Freedom* (1918); *Introduction to Mathematical Philosophy* (1919); *The Problem of China* (1922); *The A B C of Atoms* (1923); *Icarus* (1924).

RUSSELL, HENRY NORRIS (1877–). An American astronomer, born at Oyster Bay, N. Y., and educated at Princeton University. He was a Carnegie research assistant at the Cambridge Observatory in England in 1903–05. In 1905 he became an assistant in astronomy at Princeton: in 1911, professor; and in 1912, director of the Observatory there. The stars were the subject of his researches. He published papers on stellar parallax, stellar evolution, and stellar statistics, as well as on binary stars and eclipsing variables. He was an engineer in the Air Service of the United States Army in 1918 as well as a member of the National Research Council. Professor Russell became a Fellow of the Royal Astronomical Society, whose gold medal he won in 1921. In the same year he became a research associate of Mt. Wilson Observatory.

RUSSELL, JOHN (1885–). An American journalist and author, born at Davenport, Iowa, and educated at Northwestern University (1903–05). For several years he traveled widely in various parts of the world. He was special correspondent and staff writer for several papers and magazines and contributed many articles and short stories to periodicals. During the War he was in charge of the United States government propaganda in Great Britain and Ireland. He wrote *The Society Wolf* (1910); *The Red Mark* (1919); *Where the Pavement Ends* (1921), and *In Dark Places* (1924).

RUSSELL, WILLIAM FLETCHER (1890–). An American educator, born at Delhi, N. Y., and educated at Cornell University. After teaching for several years in Greeley, Colo., he became assistant professor in history and sociology at the State Teachers' College, and after studying at Columbia University and serving as assistant in the philosophy of education there, he was appointed associate professor of secondary education at the George Peabody College for Teachers in Nashville, Tenn. From 1916 to 1917 he was professor of that subject. In 1917 he was dean of the College of Education at the State University of Iowa. Professor Russell wrote *The Early Teaching of History in New York and Massachusetts* (1915); *Economy in Secondary Education* (1916); *Education in the United States* (1917); *Schools in Siberia* (1919), etc.

RUSSELL SAGE FOUNDATION. An organization incorporated in 1907 for the improvement of social and living conditions in the United States. Its work, which gives large place to research and publication, is carried on by a staff of men and women trained in special lines of investigation and social welfare. The direct activities of the Foundation are carried on through the following eight departments: Charity Organization; Child Helping; Industrial Studies; Publications and Library; Recreation; Remedial Loans; Statistics; and Surveys and Exhibits. In the decade 1914–1924, 36 books and more than 125 pamphlets and monographs were published. A number of investigations are now in process, among them, present-day administration of marriage laws in the United States; schools for juvenile delinquents; a series on various important experiments in employees' representation and other developments in industrial relations; public recreation in New York City, summer camps; the small loan business; employment statistics; social publicity methods; and arts and crafts of immigrant peoples. The library of the Foundation has developed steadily and now contains some 23,723 bound volumes and 76,914 pamphlets; its attendance in 1924 numbered 21,819. In 1917, when the United States entered the World War, the services of the staff were offered to the government. Five new Federal bureaus or divisions grew out of wartime activities with which members of the staff of the Foundation were associated in an organizing or administrative capacity: the Division of Statistics, a branch of the General Staff; a Woman in Industry Service, under the Department of Labor; an Education-Recreation Division of the Army and a similar division in the Bureau of Navigation; and a Savings Division in the Treasury. In 1919, the Southern Highland Department of the Foundation was discontinued and in 1920, the Department of Education was given up. In 1923 a new division of child welfare legislation was organized and in 1924 a consultation service in penology and delinquency was opened. The Foundation has continued its work of conference and consultation in the field of its activities. Besides the regular work, a number of grants to social agencies engaged in similar work have been made. In 1922, through a committee appointed by the Foundation, a Regional Plan of New York and Its Environs was inaugurated, to be assisted financially for a five year period and housed by the Foundation in the Foundation building. General director, John M. Glenn; president of the board of trustees, Robert W. de Forest.

RUSSIA. A federal republic comprising the greater part of the former Russian Empire and officially entitled the Union of Socialist Soviet Republics, more familiarly known as Soviet Russia. It stretches over a vast expanse of territory in eastern Europe and northern Asia. Capital, Moscow.

Political Divisions. The Union of Socialist Soviet Republics consists of six Socialist Fed-

erated Soviet Republics, which are further subdivided into autonomous republics and autonomous provinces. The principal federations are: (1) the Russian Socialist Federated Soviet Republic (capital, Moscow), embracing the principal Great Russian "governments" or states of Russia in Europe and Western Siberia; (2) the Ukrainian Socialist Federated Soviet Republic (capital, Kharkov); (3) the White Russian Socialist Soviet Republic (Minsk); (4) the Federation of Transcaucasian Soviet Republics (Tiflis); (5) the Far Eastern Republic (Vladivostok); and (6) the Bokhara People's Soviet Republic (Bokhara). The Republic of Khoresma (Khiva) is affiliated with the Union but not a member of it. The Russian Socialist Federated Soviet Republic is composed of the following autonomous republics and autonomous territories (administrative centres in parentheses): Crimean Republic (Simferopol), Bashkir Republic (Ufa), Tartar Republic (Kazan), Kirghiz Republic (Orenburg), Turkestan Republic (Tashkent), Daghestan Republic (Makhatch-Kala), Mountain Republic (Vladikavkaz), Yakutsk Republic (Yakutsk), Carelian Republic (Petrozavodsk), Buriat-Mongolian Republic (Irkutsk), Chuvash Autonomous Territory (Cheboksary), Kalmyk Autonomous Territory (Astrakhan), Mariisk Autonomous Territory (Krasnokokshaisk), Votyak Autonomous Territory (Izhevsk), Kabardin-Balkar Autonomous Territory (Nalchik), Zyriany Autonomous Territory (Ust-Sysolsk), Karachaef-Cherkass Autonomous Territory (Batalpashtchinsk), Oiratski Autonomous Territory (Oolala), Adigheiski-Circassian Autonomous Territory (Krasnodar), Volga German's Territory (Pokrovsk), Chechen Territory (Grozny).

The Transcaucasian Federation consists of three principal republics, namely, Azerbaijan (principal town, Baku); Armenia (Erivan); and Georgia (Tiflis). Tiflis is the capital of the federation. Besides these, there are also incorporated in the federation the minor republics of Abkhaz (principal town, Sukhum) and Adjar (Batum). By the Treaty of Brest-Litovsk (Mar. 3, 1918) the Ukrainian Republic was detached from Russia and placed under German control but subsequently became reunited with Soviet Russia. (See UKRAINE.) The provinces of Volhynia, Vilna, Kovno, and Grodno were separated from Russia and became part of Poland, while the provinces of Erivan and Kars passed to Turkey. The border provinces of Latvia, Esthonia, and Lithuania (qq.v.) became established as independent states, and so did the Grand Duchy of Finland (q.v.), while the province of Bessarabia (q.v.) was annexed to Rumania.

Area and Population. Russia in Europe, total pre-war area, 1,999,939 square miles, less lost territory, 178,586, leaves a present area of 1,821,353 square miles; Transcaucasia, 95,534, less Kars, 7700, leaves an area of 87,834; Asiatic Russia, 6,207,067; total Soviet Russia, 8,116,254 square miles; pre-war Russian Empire, 8,302,540 square miles. The population of present Soviet Russia is shown in the following table:

	Soviet census Sept. 1, 1920	Official estimates End of 1914
Russia in Europe	102,207,800	120,560,000
Asiatic Russia	23,407,500	21,615,000
Transcaucasia	5,683,700	6,985,000
Total	131,299,000	149,160,000

The figures for 1914 are about 10 per cent higher than those given for that year in the *Soviet Statistical Annual*, which expresses the opinion that pre-war estimates were exaggerated to that extent. No official census was taken by the old Russian government after 1897, but the changes in population were estimated each year by comparing the statistics of births, deaths, and migration. Difficulty in comparing these pre-war estimates with the recent census also arises from boundary readjustments, for it is impossible from available information to distinguish exactly the pre-war (estimated) population of certain Russian districts which have been divided between Soviet Russia and other countries. Assuming, however, that both sets of figures cited in the table above are correct, it would appear that there has been a decrease of some 18,000,000 in the population since the beginning of the War. In view of the fact that prior to the War the population was rapidly increasing (for pre-war Russia as a whole from 128,924,000 in 1897 to 182,183,000 in 1914), this decrease is striking. Of the total population of European Russia in 1920, the Ukraine had 25,605,000. The population of Asiatic Russia was distributed between Siberia, 11,160,300; Kirghizia, 5,045,700; and Turkestan, 7,201,500. Of the total population, 61,046,200 were males and 70,252,800 females. On Mar. 15, 1923, a census of the urban population revealed that the population of Russian cities and towns in general had declined by 1.8 per cent compared with the census of 1920. The total urban population was found to number about 21,700,000, exclusive of army garrisons. A comparison of 1772 cities and towns showed an increase of population from 17,606,000 in 1920 to 18,239,000, or 3.6 per cent. An increase of 858,000 in the population of the two capitals, Moscow and Petrograd, during this period, was somewhat offset by a decrease of 225,000 in all the rest of the townships. Eliminating Moscow and Petrograd, as well as Eastern Siberia, Turkestan, Transcaucasia, and four provinces where no census was held in 1920 (Volhynia, Podolia, White Russia, and the Crimea), the results of the census of Mar. 15, 1923, were as follows:

Regions	Number of towns	Inhabitants, 1920	Inhabitants, 1923	Percentage of shift
Russian Soviet Republic:				
Consuming (industrial)	459	2,665,178	3,061,830	+14.9
Producing (agricultural)	408	4,687,554	4,407,798	− 6.7
Ukraine	318	4,212,452	3,907,572	− 7.6
Southeastern region (Kuban, Stavropol, etc.)	49	1,262,258	1,210,728	− 4.1
Kirghizia (steppes)	21	363,373	371,445	+ 2.2
Western Siberia	55	865,195	837,222	3.2
Total	1,310	14,056,010	13,796,595	− 1.8

The growth of industrial production in certain localities and the famine of 1921 in the

agricultural belt greatly affected the movement of population. In the so-called consuming districts, outside of the agricultural belt, all of the 17 provinces comprising the northwestern section of Soviet Russia showed an increase of urban population. The five great textile districts have shown the highest accretions. Of the 19 provinces comprising the so-called food-producing belt, those four adjacent to the industrial area showed increases of urban population, while the remaining 15 showed decreases ranging from 20.8 per cent in Samara down to .4 per cent in Astrakhan. Of the nine provinces of the Ukraine, the four northern showed increases. In the four southern provinces heavy declines were registered: Volhynia, 11.2 per cent; Donets, 12.1; Ekaterinoslav, 16 5; and Odessa, 23 8 per cent. The estimated decrease in Podolia was .8 per cent. The population of the city of Odessa dropped from 454,187 to 316,740, or 30 3 per cent; Nikolaiev, from 108,777 to 81,366, or 25.2 per cent; Kherson, from 74,703 to 40,796, or 47.5 per cent—the heaviest percentage of decline in Russia. The population of the principal cities of Russia (above 50,000) in 1917, 1920, and 1923 was as follows (the figures of 1897 are not comparable as regards the male population, since the latter included the military garrisons, which were eliminated in the census of subsequent years):

	1917		1920		1923	
	Total	Female	Total	Female	Total	Female
Archangel			45,278	22,420	53,532	26,520
Astrakhan			116,094	65,197	133,181	70,759
Chelyabinsk	46,918	23,947	57,476	30,475	54,166	28,827
Ekaterinburg			90,011	47,188	96,771	51,210
Gomel	64,756	34,880	61,069	32,554	75,939	39,325
Ivanovo-Vosnesensk	85,203	49,674	58,203	33,629	71,879	39,305
Kazan	192,659	103,412	147,678	81,215	158,208	85,382
Kostroma	64,644	36,940	49,978	28,392	59,486	32,724
Kursk	90,502	49,920	79,807	44,153	85,732	45,659
Moscow	1,701,264	934,019	952,255	526,246	1,490,048	769,268
Nijni-Novgorod	148,130	82,486	105,918	56,499	133,919	69,457
Orel	90,058	47,588	63,832	34,735	71,519	37,773
Penza	105,050	57,862	85,070	46,390	79,560	42,477
Perm			68,038	35,956	67,986	36,560
Petrograd*			722,229	420,618	1,043,631	564,021
Rybinsk	58,813	29,058	39,835	20,567	48,844	25,079
Samara	227,951	125,132	175,806	94,444	150,192	80,169
Saratov	223,414	120,311	189,242	102,559	183,145	98,535
Simbirsk	74,278	38,065	79,048	42,159	68,967	36,934
Smolensk	72,559	36,934	57,224	30,049	66,812	34,616
Syzran	50,983	28,704	50,387	28,084	43,359	23,325
Tambov	76,434	42,024	72,695	39,626	70,312	37,669
Tula	156,583	77,596	128,408	62,809	123,443	62,783
Tsaritsyn	132,673	68,173	90,396	48,686	106,783	56,714
Tver	101,132	56,267	66,095	36,193	83,348	44,945
Ufa	104,691	58,450	92,766	50,494	84,272	45,283
Viatka	40,908	22,894	40,769	20,503	53,198	26,167
Vitebsk	100,172	56,438	80,003	44,127	87,726	46,362
Vologda	69,664	37,254	46,981	23,952	52,935	27,497
Voronezh	126,942	72,220	90,382	49,045	94,185	50,760
Yaroslav	125,194	68,564	76,372	41,276	89,881	47,749

* Renamed Leningrad on the death of Lenine, in January, 1924.

In 1920 the proportion of male population to female in the towns and cities was 455 males to 555 females; in 1923 it was 470 males to 530 females. In all cities and towns the number of men increased by 566,000, or 7 per cent; the number of women by 67,000, or .6 per cent. With the elimination of Moscow and Petrograd, however, the number of men increased by only 93,000, or 1.2 per cent, while the number of women decreased by 318,000, or 3.7 per cent. The above shifts were chiefly the results of the demobilization of the Red Army.

Government. The form of government of the Union of Socialist Soviet Republics (U.S.S.R.) may be described as an oligarchy in the guise of a federated republic. According to the new Soviet constitution drafted in July, 1923, and ratified in February, 1924, sovereign power is vested in the supreme organs of the Federation, i.e. the Union Congress of Soviets, the Central Executive Committee of that Congress, and its Presidium. The Congress of Soviets, of about 2000 members, is elected by the various congresses of the federated republics and meets for a week once a year. The Central Executive Committee is composed of two houses, known respectively as the Federal Council and the Council of Nationalities, the former consisting of 371 members elected by the Federal Congress of Soviets according to population, and the latter of some 98 members, five elected by each federated member state and one by each of the autonomous republics or districts. Each of these two houses elects its own Presidium, or standing committee, of seven members. Between sessions of the Federal Congress of Soviets, the Central Executive Committee is the supreme organ. It meets three times a year and is replaced during recesses by a presidium of 21. The Central Executive Committee jointly elects federal commissars (or ministers) on the following basis: (A) five federal commissariats, all regional representatives of which in the participating states are appointed by and responsible to the Union commissars, viz.: (1) foreign affairs; (2) army and navy; (3) foreign trade; (4) transport; (5) post and telegraphs; (B) five "combined" commissariats, each of which has parallel commissariats in the various participating states, chosen by the latter but approved by the federal commissars, whose authority is shared by them, viz.: (1) supreme council of national economy; (2) food; (3) labor; (4) finance; and (5) workers' and peasants' inspection. The 10 commissars at the head of these commissariats, together with a president and vice president, form the Union Council of People's Commissars. This body enjoys legislative and executive powers subject to higher authority. The whole country is under a single system of law and a single Supreme Court subordinated to the Central Executive Committee, whose presidium appoints 7 of the 11 members of the bench, and to which body the public

prosecutor may appeal cases for final decision. One of the members of the court is a representative of the United State Political Administration (O.G.P.U.). Under the constitution, each federated republic is required to function on a soviet basis, with a central executive committee and council of people's commissars. The Federation has exclusive control of foreign relations and alone may alter the external boundaries of the Federation; settle boundary disputes between participating republics; conclude treaties for admission of new members; declare war and conclude peace; negotiate foreign and internal loans for the Union, as well as give permission for such loans to the federated republics; regulate foreign and domestic trade; inaugurate the general economic policy of the Union, control industry and grant concessions in the name of the Union and of the separate republics; manage transportation, posts, and telegraphs; organize and command the armed forces of the Union; approve the budget and levy taxes; establish a monetary system; direct the use of land and all natural resources; control migration; shape civil and criminal legislation, labor laws, and educational and sanitary legislation for the Union; establish a system of weights and measures; issue federal statistics; promulgate legislation concerning the rights of citizens and foreigners; and grant amnesty throughout the Union. It has the power to annul any unconstitutional measure of the federated republics, and to settle any dispute between them. The federated republics retain the meagre rights of sovereignty and autonomy not withdrawn by the constitution Each may amend its constitution within the limits set by the federal constitution. No boundary of a republic may be altered without its consent. Any republic may withdraw at will from the Union. In short, the participating republics are given a semblance of sovereignty within their respective territories, while the absolute and final control of all important affairs, both foreign and internal, rests in the hands of the federal government in Moscow.

The Communist party with its 600,000 disciplined adherents is the ruling group in a nation of 131 000,000 people. Needless to say, there is no democracy in Russia. Suppression of the press and of free speech, drastic limitation of the suffrage, and terrorist methods are some of the means by which the present régime is maintained. The oligarchical control of the Communists is facilitated by a singularly effective indirect system of election. The electoral system of the soviets is ultimately based not on a territorial unit, such as a State, county, or township, but on an association unit, such as a factory, a soviet institution, a regiment, or ship, each body being dominated by a so-called nucleus of Communist party members, so that the perpetuation of the power of the Communist party is assured. Because of the impracticability of the economic unit system in rural communities, where each farmstead represents a unit, delegates are there elected from administrative units, i.e. the village or volost (group of villages); but due to the system of graduated elections in the case of rural communities, passing through several successive stages before members of the central congress (of a federated republic) are finally elected, whereas the cities and the larger industrial corporations send their representatives direct to the congress, the votes of the masses of peasantry are effectively submerged. Although a large or even overwhelming majority of the delegates elected on the primary ballots in any one province or district may be non-Communist, the final ballots turn out 100 per cent Communist representation in the supreme legislative body, the Central Executive Committee of the Congress of Soviets. At its annual meeting the Communist party elects a central committee of 40 members, which in turn elects a political bureau consisting of seven members and four alternates. Through this body the Communist party directs and controls the policy of the soviet government. Once a policy is decided on by the Political Bureau, it is referred to the Central Committee of the Communist party, which passes it as a matter of course and has it approved by the Central Executive Committee of the Union, which it controls absolutely. To prevent friction between the various important organs of party and state, the same Communists hold offices in a number of organs, thus creating a political interlocking directorate. In the last analysis, therefore, the real governing power in Russia is the Communist party.

Education According to the census of 1920 only 32 per cent of the entire population of Russia is literate. If children under eight be excluded, the percentage of illiteracy still amounts to 60. As in the case of all backward countries, the female population lags behind the male; there are 529 literate men to every 300 literate women. By locality, illiteracy increases centrifugally from Moscow toward outlying parts of Russia, particularly eastward toward Siberia, the Caucasus, and the Trans-Caspian Republics. Thus, in the Samarkand province of Turkestan the illiterate population constitutes 94½ per cent of the total. In Russia proper were registered 27,500,000 totally illiterate persons above the age of eight; in the Ukraine, 12,000,000; in the autonomous federated Republics, 6,000,000; with other districts, this makes a grand total of 54,000,000 above school age. By profession or occupation the highest standard of literacy was found in the soviet army, 826 per 1000, and in the navy, 942 per 1000. Taking the entire able-bodied working population of Soviet Russia between the ages of 16 and 50, there were 73 per cent of males and 36 per cent of females who could either read or write or both. A comparison between the returns of the literacy census of Russia in 1897 and 1920 shows up as follows:

	(Per 1000)			
	Male		Female	
	1897	1920	1897	1920
European Russia	326	422	136	225
Northern Caucasus	241	357	56	215
Western Siberia	170	307	46	134
General	318	409	131	214

The number of elementary schools, number of pupils, and percentage of girls, show the following developments since pre-war years:

School Year	Schools open January 1	Pupils Attending	Percentage of Girls
1910–11	55,000	3,552,000	32.4
1914–15	64,000	4,281,000	35.0
1920–21	70,000	6,060,000	42.0
1921–22	58,000	4,915,000	42.1
1922–23	53,000	4,400,000	37.1

Following the Bolshevik revolution, the Soviet authorities inaugurated an ambitious programme of popular education, but after 1921 all appropriations were curtailed to the minimum, and the number of schools as well as of pupils attending shrank in many cases far below prewar levels. In 1913, the proportion of the appropriations for the Ministry of Education and the general state budget amounted to 6.1 per cent, which rose as high as 7.5 per cent in 1916. These appropriations, however, covered only state-maintained colleges and primary schools but did not concern the great number of private educational institutions. Under the Soviet régime, no private schools are permitted except of the narrowly specialized type such as accountancy, shorthand, etc. It is part of the Communist platform that all Russian schools must remain in the hands of the state. In 1920, the appropriations for the Commissariat of Education amounted to 10.4 per cent of the total budget, but in 1921 they fell to 8 per cent, in 1922 to 4.2 per cent, and in 1923 to 3.4 per cent. The number of high schools or secondary schools likewise declined greatly. There were in the 1921–22 school year 1470 high schools with 199,676 pupils, but the number fell to 963 schools with 168,350 pupils in the year following. This change was partly accounted for by the transfer of a number of high schools into the category of combination primary and high schools, of which there were in the 1922–23 school year 572 with 211,574 pupils. The number of these schools which have a seven-year curriculum is increasing. The number of kindergartens fell by two-thirds in 1922–23 compared with 1920, from 2256 with 114,270 children to 839 with 40,450 children.

Higher Education. The number of colleges and specialized educational institutions in Soviet Russia in 1922–23 was 202 with 166,274 students. These were distributed as follows, by categories:

Category	Percentage of Colleges	Percentage of Students
Universities and colleges	14 4	37 8
Medical and veterinary schools	5.6	6 5
Normal schools	25 5	8 3
Agricultural colleges	14 4	13 1
Technological	18 8	20.3
Arts and music	13.1	6.4
Economic and industrial	5.6	5 8
All others	2 6	2 7

The great majority of colleges are located in the two capitals, Moscow and Petrograd, with 44.4 per cent of all students in Moscow and 30.8 per cent in Petrograd. The number of colleges and students increased in the two capitals but declined sharply throughout the rest of the country. In both the capitals, the number of college students amounted to 4 per cent of the population. The percentage of women students in colleges of general academic character was 52.4 (excepting the universities, where it was 45.3); in art schools and conservatories, 50.2; in medical colleges, 53.5; and as high as 69.2 in normal schools; in agricultural colleges, 25.9. The lowest proportion was in technological schools, 9 2 per cent. In addition to universities and colleges of the general type, there exist in Soviet Russia so-called "workmen's faculties" in which only Communists may enroll; the students are supported by a government stipend. On Jan. 1, 1923, 81 such "faculties" were open with 30,557 students. Of this number, 60 schools with 24,455 students were in the European part of the Russian Republic proper, of which 25 per cent were women. There were 20 such schools in Moscow and 9 in Petrograd, with a total of 14,867 students. Of a lower type than the academic and polytechnic institutes are the technicums, specialized institutions or courses giving an essentially practical training with greatly condensed theoretical background. These institutions are found mostly in provincial cities and like the workmen's faculties did not exist before the Revolution. In 1923 such schools numbered 359 with 49,586 students attending. The highest proportion were normal schools, 32.6 per cent, with 27.9 per cent of students, followed by manual training schools, 23.3 per cent of total number, with 26.7 per cent of the students; art and music, with 14.3 per cent of schools and 17.9 per cent of students. These institutions were the only ones whose number increased during the three years preceding. Their number grew from 255 in the 27 principal governments of Russia, with an average number of 127 students, to 272 in 1922–23, with an average number of 145 students. The percentage of women increased from 37.2 per cent to 42 per cent.

National Defense. The Soviet military establishment is directly under the Commissar of War and Navy, Leon Trotsky, and is controlled by the Supreme Revolutionary War Council (Revvoensoviet), which consists of 15 members and is attached to the Commissariat of War and Navy. It decides all military questions but delegates to one of its organs, the Political Administration of the Revvoensoviet (P.U.R.), independent decision over political matters. Before promulgation, every decree covering military affairs must be confirmed by the Council of People's Commissars. Declarations of war are made by the Union Central Executive Committee. The general staff of the Red Army is under the direction of the Revvoensoviet, the chief of the general staff designated by the Council of People's Commissars being an additional member of the Revvoensoviet. The commanding general of the army is under the direction of the Commissar of War and Navy, but he has complete power over military training and field operations. The strength of the regular standing army was 550,000, composed of 300,000 infantry, 60,000 cavalry, 95,000 technical troops, 25,000 artillery, 30,000 naval, and 40,000 various auxiliary troops. In addition to the above there were under arms 150,000 of the State Political Department (G.P.U.) troops, 60,000 in border units and 90,000 in interior units. Together with the four classes in the "changing personnel" of territorial divisions with 1,200,000, the total organized forces in 1924 numbered 1,900,000. Together with unorganized trained reserves, the total military man power amounted to 13,000,000. The proportion of the population trained for war service is 4.3 per cent. The most important positions in the army are held by members of the Communist party. In the cavalry 55 per cent of the regimental commanders are Communists; in the infantry 48 per cent; division and corps commanders, 66 per cent. Among the regimental and higher commanders, 22 per cent are old officers, 60 per cent officers commissioned during the War, 9 per cent graduates of red military schools, and 9 per cent of no special military education. Of the general

staff four-fifths of the members are old general staff officers who served during the War. Each unit of the army has its commissar, who must remain at least one year with his command. Each section has its club, and the regiment is provided with moving-pictures. Every squadron, battery, company, etc., has a nucleus of Communist soldiers, at the head of which is a political leader. The entire army is youthful; the average of officers commanding divisions is 30 years.

Naval See NAVIES OF THE WORLD.

Aeronautic. In 1924 there were 432 planes in the Russian air service and 36 balloons, of which 20 were attached to the field artillery, 10 to the coast artillery, and 6 to armored-train units. The air forces were divided into 12 squadrons, each of two groups of escadrilles. Each group was subdivided into 3 detachments of 6 planes each. There were 42 aërodromes, the chief one near Moscow, the centre of air activities The Russian air programme was most ambitious and planned to cover an increase to 5000 planes by 1926.

Agriculture. Approximately five-sixths of the population of Russia are classed as rural, and the problem of adjusting the theories of the Russian Revolution to meet the interests of this great class has been a source of much concern to the Soviet authorities. (See *History.*) The land expropriation which accompanied the Bolshevist uprising and its redistribution resulted in an increase in the landholdings of the peasantry from 70 per cent of the total cultivated acreage to 96 per cent in European Russia and from 55 per cent to 96 per cent in the Ukraine. In some districts of European Russia the dissolution of large holdings was still more drastic. For instance, in 36 provinces, according to data of the Central Land Administration for Nov. 1, 1920, out of a total of 22,800,000 dessiatines (1 dessiatine = 2.7 acres) of land not formerly tilled by the owners themselves, 21,400,000 dessiatines were distributed among the peasants, thus increasing their landholding (exclusive of forests) from 80 per cent of total to 99 per cent. On the average, the landholdings of the peasants increased from 1.87 dessiatines (5 acres) per capita of consumers ("mouths") to 2.26 dessiatines (6 acres), although in some districts this accretion is much smaller, down to fractions of a dessiatine. There remained in 1922 the following larger land units: (1) 5918 Soviet state farms, of a total area of 3,918,000 dessiatines, including 2,079,000 dessiatines in European Soviet Russia and 1,038,000 in Siberia and the distant border provinces, of which 1,158,000 dessiatines represent arable land; (2) 4,233,000 dessiatines controlled by 15,121 coöperative communes, with an average holding of 2.4 dessiatines per "mouth" and 3.7 dessiatines per worker. In the process of redistribution of land, not only had all the large landed estates been wiped out but larger peasant holdings disappeared as well. Between 1916 and 1919 the number of farm units of over 8 dessiatines (21.6 acres) declined from 8 per cent of the total number of farms to 3 per cent, and the group of farms comprising 4 to 8 dessiatines declined from 21.6 per cent to 16.4 per cent of the total. The percentage of pasture lands also declined from 11.4 per cent to 6.5 per cent. On the other hand, the percentage of small units under 4 dessiatines (10.8 acres) increased from 59 to 74 per cent of the total. As a result, small farms of less than 8 dessiatines comprise at present 90 per cent of the total farm holdings in the country.

Sown Area and Crops. Not over one-third of the total area of Russia, including Asiatic territory, is capable of agriculture, and much less is used. In European Russia most of the land suitable for use is occupied, much of it with very dense population. Owing to changes of boundaries, pre-war statistics cannot be compared directly with more recent statistics Eliminating lost territory and also Turkestan and Transcaucasia, an approximate comparison for all principal cereals and potatoes shows, for 1913, 245,700,000 acres; 1916, 223,020,000; 1920, 173,716,000; 1921, 161,811,000; 1922, 136,609,000; and 1923, 162,070,000. In calculating the yield per acre from local reports, which are made up according to the five-mark system (1 = poor; 2 = unsatisfactory; 3 = medium; 4 = good; 5 = excellent), the Central Statistical Bureau admitted an underestimation about 6 per cent, on the strength of the actual crop data for a number of years, as compared with the totals figured out by the five-mark system. Moreover, it was found that certain corrections were needed for local reports of sown acreage, because of the tendency of the peasant taxpayers to understate the extent of acreage planted by them. These corrections were found to range between 5 and 10 per cent, or an average increase for the entire country of 7 per cent. The evolution of the total sown area of Soviet Russia, exclusive of Turkestan, and of the Ukraine, inclusive of field crops and potato crops converted into grain equivalents at the rate of 4 poods to 1, from 1920 to 1923, is shown in the following table:

	1920	1921	1922	1923
			(Dessiatines)	
Russia in Europe	37,495,300	35,422,400	31,446,600	37,941,500
Kirghizia	3,273,600	2,385,800	1,822,000	1,697,900
Siberia	5,756,300	4,307,800	3,074,200	3,677,000
Total Asiatic Russia	9,029,900	6,693,600	4,896,200	5,374,900
Total Soviet Russia	46,525,200	42,116,000	36,342,800	43,316,400
Ukraine	17,814,100[a]	17,814,100	14,253,000	16,709,500
Total Soviet Union:				
In dessiatines	64,339,300	59,930,100	50,595,800	60,025,900
In acres	173,716,000	161,811,000	136,609,000	162,070,000

[a] Estimated.

After introducing corrections as mentioned above, the 1923 sown area of Soviet Russia and the Ukraine would be represented at 65,590,300 dessiatines or 177,094,000 acres, of which 41,629,100 dessiatines are in European Russia; 17,-

963,400 in the Ukraine; and 5,997,800 in Asiatic Russia Compared with pre-war area, the revised 1923 estimates of the Central Statistical Bureau amount to 73 per cent of the official estimates of the 1913 area. The ratio of acreages planted in 1923, as revised by the Department of Agriculture (increased by 20 per cent), to official data of 1913 (increased by 10 per cent), taken as 100, are as follows: rye, 95; winter wheat, 72.7; spring wheat, 38.9, oats, 58.4; barley, 59.6; buckwheat, 120; millet, 163.6; corn, 177.8. The gross crop of the seven principal cereals, rye, wheat, barley, oats, buckwheat, millet and corn, is estimated for 1923 according to the basic data of the Central Statistical Bureau at 2,153,000,000 poods, and with the above corrections for yields per acre and for sown acreage at 2,432,000,000 poods; with the addition of all other crops, including potatoes, in grain equivalents (1 pood for 4), at 2,795,000,000 poods without correction, and 3,147,000,000 poods, corrected as above. In the following table the gross crops of principal cereals are compared for the four years 1920–23, without correction:

	1920	1921	1922	1923
	(In millions of poods)			
European Russia	1,075	842	1,263	1,178
Asiatic Russia	254	214	193	165
Ukraine	779	633	755	808
Total	2,108	1 689	2 211	2,151

It is thus found that agriculture in Russia was being rapidly restored, and with three or four years of fairly satisfactory crops, it might be expected to reach pre-war proportions. It is the one line of production where human enterprise and endeavor have been practically unaffected by the Communist régime from the start and given more freedom and opportunity to dispose of their output and to export the surplus production of grain, the peasantry would attain greater prosperity than they ever enjoyed in the past and would thus enhance the general level of prosperity of the entire nation.

and the Far Eastern Republic (about 227,000,000), or a total of 5,205,000,000 rubles. Thus the gross value of the 1923 agricultural production amounted to 67 per cent of the pre-war. Compared with the production for 1922, it represents an increase of 11 per cent. Up to 1924, under the monopoly of foreign trade, the Soviet state institutions were the ultimate purchasers of all grain for export, and the exports of cereals, resumed tentatively in 1922 for the first time since the outbreak of the War, had attained considerable proportions in 1923. The exports of cereals in 1913, in bushels, were: wheat, 122,124,420; rye, 25,418,400; barley, 179,886,350; oats, 41,187,500; all cereals, 11,728,000 tons. In 1922 the grain exports were practically nil; the imports for famine relief were considerable. In 1923 the exports of rye were 47,440,250 bushels; wheat, 12,192,000; barley, 10,053,000; oats, 7,048,400; all cereals, 2,191,080 short tons. Exports of tobacco, 1913, 28,480 short tons; 1923, 2380; flax fibre and tow, 1913, 6060; 1923, 37,200; hemp, 1913, 74,340; 1923, 4840. The total value of grain exports alone, in 1923, was estimated at 107,127,000 rubles (at 1913 prices), as against 602,684,000 in 1913 (including flour not exported in 1923); these were the chief factor in restoring the favorable trade balance for Soviet Russia, especially during the last quarter of 1923. They indeed comprised 52 per cent of the total exports for the year.

Live Stock. The ravages of famine and civil war greatly decimated the working live stock and dairy herds of Russia Energetic measures were taken by the Soviet authorities to avert the peril to agriculture resulting from a shortage of horses and working cattle, with the result that the year 1923 showed an improvement for the first time since 1914 It must be pointed out that the herds of cattle, and especially the horses, had been considerably reduced even prior to the Bolshevist Revolution, due to war conditions. The movement of stocks during the decade from 1914 is illustrated in the following table:

	Russian Empire within present Soviet boundaries	Same, excluding Eastern Siberia Turkestan, and Transcaucasia [a]		
	1914	1921	1922	1923
Horses	31,312,172	23,670,000	18,977,000	19 700,000
Cattle	44 708,570	38,132,000	32,977,000	38,600,000
Sheep and goats	78.721,038	47,157,000	41,298,000	56,500,100
Swine	13,550 846	13,501,000	7,658,000	9,100,000

[a] Turkestan and Azerbaijan, according to the census of 1920, contained 830,000 horses, 2,048,000 cattle, 16,408,000 sheep and goats, and 102,000 swine

The total value of agricultural production in 1923 is estimated by Soviet statisticians at 4,772,000,000 rubles. The average pre-war production for the years 1911–13 was estimated at 9,500,000,000 rubles for the Russian Empire, and deducting 18 per cent for the Succession States separated from Russia, at 7,800,000,000 rubles. The total value of 1923 production is distributed as follows: cereals, 2,191,000,000 rubles; potatoes and sugar beets, 226,000,000; fibre plants, flax, hemp, etc., 95,000,000; oil seeds, 177,000,000; tobacco and vegetable truck, 440,000,000; cattle and poultry, 1,325,000,000; fodder grasses, 202,000,000; orchards and vineyards, 116,000,000; total, 4,772,000,000 rubles. To this must be added the value of gross production of Transcaucasia (about 150,000,000), Turkestan

Forest Area. According to the latest data, compiled in the summer of 1923 by the Commissariat of Agriculture, the area under timber in Soviet Russia is represented as follows: Russia in Europe, 398,024,585 acres; Western Siberia, 992,383,988 acres; Far Eastern territory, 313,537,835 acres; a total of 1,703,946,408 acres. Of this amount 1,107,296,263 acres are estimated as exploitable forest. Due to the uneven distribution of forest land over the entire territory, timberland available for normal consumption of the population varies widely in different sections. The timber resources available for felling amount annually in Siberia to 120,508,000,000 board feet, and in the Far Eastern territory to 31,374,000 acres, while for the entire Russian territory they are estimated at

255,130,000,000 board feet. Only a small portion of timberland had been properly surveyed up to 1924.

Fisheries. Prior to the War the Russian fishing industry occupied, in volume of production, the second place in the world. In 1913 the year's catch of Great Britain amounted to 12,330,000 long tons, Russia coming next with 73,215,000 poods or 11,840,000 tons (62 poods = 1 long ton). In addition to its domestic catch, Russia imported annually about 25,000,000 poods of fish, bringing the total yearly consumption to about 100,000,000 poods. Following the Bolshevist Revolution, the catch in 1918 dropped to 5,000,000 poods, but subsequently increased year by year and amounted to 7,000,000 poods in 1919, 8,000,000 in 1920, 11,000,000 in 1921, and 18,000,000 in 1922. The last figure represents the output of the state fisheries only. Adding to this total about 8,000,000 poods, representing the output of the fisheries operated by private concerns under lease from the state and that of independent fishermen, the total output for 1922 amounted to about 26,000,000 poods or 35 per cent of the pre-war figures The total value of exports of fish and caviar in 1914 amounted to 2,512,000 rubles; that of imports, 27,419,000 rubles. In 1922 imports of fish amounted to 11,384,000 rubles, at pre-war prices; exports of caviar, 925,000. The improvement was especially marked in the fishing industry of the Lower Volga and the Caspian Sea, whence comes practically all the fall catch and where are found the most valuable species of red fish, i e. sturgeon and salmon, and white fish, and where the great caviar industry of Russia was concentrated. The average output of the district for the five years 1908–13 amounted to about 3,000,000 poods. The catch of 1919, under conditions of conscription of the fishermen and fisheries' employees, amounted to about 500,000 poods, which increased in 1920 to 1,650,000 poods. Under the Soviet decree of May 31, 1921, the so-called "new economic policy" was introduced in regard to the Astrakhan fisheries: the management was freed from interference of any kind from administrative bodies, which thitherto had exercised control in one form or another over the activities of the fisheries, with the result that both the number of fishermen and their output showed a sharp increase, thus, the number of fishermen registered in the fall of 1921 amounted to 27,000, against 6000 in the fall of 1919, and 10,000 in 1920. The average output of the fishermen increased from 36 poods in 1919 to 88 poods in 1921. Along with the independent fishermen, the employees of the fisheries were likewise removed from universal labor duty and put on straight output pay. The results were shown in the per capita output of the men and the output per net. In the fall of 1920, 18,000 fishery employees handled 1,650,000 poods of raw fish, or about 90 poods apiece, while in the fall of 1921 approximately 10,000 fishery employees handled 2,783,000 poods, or about 278.5 poods apiece. The Astrakhan catch of 1922 amounted to 3,400,000 poods, thus exceeding the pre-war average Of this quantity, 68 per cent represented the output of state-operated and state-leased fisheries; the remainder was brought in by independent fishermen.

Industry. In proportion as the fundamental communistic principles of compulsory service, subsistence rationing, and productive work "for the good of the commonwealth and not for profit" were discarded (see *History*), an ever closer approximation was sought to "business management methods" and industrial efficiency in state-operated enterprises. As the load factor of now one and now another of the nationalized industries fell to the danger point, threatening complete breakdown, heroic measures were resorted to in order to stimulate production by throwing all available resources in that direction, generally at the expense of other nationalized industries. This policy of spasmodic forced stimulation of output of separate works, or groups of plants, led inevitably to perpetual breaks and slumps, and to forced curtailment of the number of state employees; to the cutting down, again and again, of minimum wage scales, and finally to the transfer of practically all the industries from direct state management to that of "trusts" and "syndicates" specially organized by the government and left to shift for themselves in the matters of providing operating funds and marketing their product. The Bolshevist contention is, however, that while the socialistic basis of production "for the good of the commonwealth" has been abandoned for the capitalistic system of operation for "profit," the distinction between state capitalism in Soviet Russia and the individualistic capitalism of the rest of the world lies in the fact that the profits accruing from the operation of the trusts, at the expense of labor, are in the case of the Soviet republics supposed ultimately to return to the proletariat, which controls the state, and through it, the state trusts. Since the inception of the "new economic policy" (see *History*) two contrary developments have manifested themselves in the trend of industrial production: on the one hand, the continued process of exhausting the means of production in industry; on the other, the improvement in the organization of industrial processes and of exchange. This improvement is expressed in increasing productivity of labor, concentration of production, and gradual organization of the processes for disposing of output; better organization of transport services; embryonic appearance of credit; improvement in the financial apparatus for collecting taxes; and the decreased share of paper currency in the national budget

Of the factors contributing to the increased output, the chief is found in the satisfactory crops of 1922 and 1923, and low prices for bread and fodder; these enabled wages almost to double in the course of 1922 and thereby enhanced the productivity of labor. The improvement in the supply of foodstuffs in the cities checked the migration of urban population to the country and started a new movement of population from the villages cityward Another factor is found in the curtailment of importation of foreign goods since the fall of 1922, owing to the systematic policy of the Soviet government In addition, the industries were supported by state contracts: but above all, the state issued considerable subsidies to the industries The sum total of subsidies thus appropriated and issued during the fiscal year 1921–22 amounted to 160,000,000 gold rubles, and in 1922–23 to 175,350,000 rubles, to which must be added the indebtedness to the state-controlled banks, which amounted at the close of the operating year (Oct. 1, 1923) to some 186,500,000 rubles. Notwithstanding the increased output and the great dearth of manufactured goods in the home mar-

kets, the anomalous costs of production, especially in overhead costs, rendered the prices prohibitive to the great mass of the population, and all industries continued operating at heavy deficits. In order to reduce the burden of support by the state for the basic industries, curtailment and concentration were resorted to periodically; production in every industry was centralized as far as possible at a few of the higher plants, which retained the best equipment and were most advantageously situated as to supply of raw materials, transportation, and marketing facilities. An increase of output and greater productivity per unit compared with previous years resulted from more efficient management and the concentration of production, are used over again in further manufacturing, the gross value of commodities in 1921–22 and 1922–23, as comparable with 1913, is shown in the following summary. These totals, expressed in pre-war gold rubles, do not cover the entire field of industrial production but only that part of it for which more or less closely comparable data can be presented for the three years under survey Thus, the total value of production of major industries for 1922–23 is calculated at 1,077,716,600 pre-war gold rubles, while, according to the data of the *Statistical Bulletin of the Council of National Economy*, which purports to cover approximately 80 per cent of the industrial enterprises, the value of production is estimated at 1,196,347,000 rubles.

Branch of Industry	1913	1921-22 (In gold rubles)	1922–23
Fuel (coal, oil)	410,551,400	180,396,400	202,576,600
Ore mining	133,546,800	11,796,600	18,928,500
Silicate (glass, cement)	87,598,000	9,882,200	17,296,700
Metals	726,700,000	86,998,200	148,594,000
Electro-technical	32,166,700	14,918,400	25,880,700
Electric power plant	.... ..	14,055,700	18,415,000
Textile	825,900,000	215,560,800	327,625,700
Leather and shoes	68,214,900	55,145,300	56,032,900
Chemical, including rubber and dyes	185,973,100	54,617,200	86,189,100
Foodstuffs	720,539,100	55,822,000	96,200,500
Woodworking	135,706,000	21,470,000	56,101,600
Paper	57,250,600	10,925,700	23,876,300
Total	3,384,146,600	731,648,300	1,077,717,600
Percentage	100	21 6	31.8

in spite of the heavy deficits incurred and the accumulation of unsold stocks.

Volume of Later Industrial Production. The volume of production of the basic industries in 1922–23, as compared with the preceding year and the pre-war output, can be summarized as follows:

Items	1922–23 Short tons	1921–22 (2000 lbs.)	Per cent of increase	Per cent of 1913
Coal	11,642,600	10,613,720	10	37 1
Iron ore	470,700	299,750	57	4 6
Manganese ore	78,700	30,290	160	5 7
Petroleum	5,635,500	4,940,430	14	55.4
Pig iron	332,380	187,960	75	7 2
Open hearth steel ingots	647,110	350,340	84	13 8
Cotton yarn	76,930	54,130	42	26 6
Linen yarn	30,200	17,790	73	80 0
Woolen yarn	15,580	12,460	25	36 0
Paper	75,500	29,230	160	46 0
Basic chemicals[a]	221,400	132,700	67	40 0
Sugar	410,430	227,140	80	27 5

[a] Acids, alkalies, salts, and fertilizers.

While substantial gains in varied measure are thus seen to have been made in the quantity output for 1922–23 as compared with the preceding year, and in respect of pre-war levels, a comprehensive estimate of the degree of aproximation to the production of wealth in 1913 can be arrived at by summing up the values of commodities produced during the years 1921–22 and 1922–23 in relation to the aggregate value of pre-war production.

Value of Later Industrial Production. It has been calculated that the net production, or increment of wealth, in 1913 by the major industries, after deducting the cost of raw materials and of fuel consumed, amounted to 2,657,000,000 gold rubles. Taking the production of the entire manufacturing industry, including all enterprises employing 16 workers and over, with mechanical equipment, and excluding the value of semifinished goods, representing the output of certain of the units, when these materials These parallel data show a gain in the value of the last year's production of more than 40 per cent as compared with the previous year, and a close approach to one-third of the pre-war total.

Leased Enterprises. With the inauguration of the "new economic policy" a certain number of enterprises of minor importance were set aside for leasing to private interests. Up to Oct. 1, 1923, a total of 5241 plants, or 72 per cent of the total originally listed for leasing, passed from direct State control. The leased enterprises belonged exclusively to the category of small workshops, with an average employment of 16 persons Only 30 per cent of the total leased were taken over by former owners and 22 per cent by other private parties, 11 per cent are operated by various State organizations as side lines; 23 per cent by cooperative associations, and 14 per cent by labor associations By groups of industries the leased shops are divided as follows: production of foodstuffs, 1770, tanneries and leather workshops, 1556; metal-working, 602; textiles, 336; printing trades, 317. The total output of the leased enterprises in 1923 was negligible, amounting in value to less than 4 per cent of that of the state-controlled enterprises. This does not include, however, the unorganized handicrafts and home industries, which competed successfully with the state industries, and whose output reached considerable proportions.

Labor and Wages. In 1917 the total number of workers employed in all industries amounted to 3,308,000. By 1921 it shrank to 1,614,370. It continued falling until the end of 1922 and reached in October a total of only 887,500. After that the number of workmen began increasing, and a total of 1,037,500 were registered in September, 1923. While this increase was recorded, the number of unemployed in the cities kept growing at an even faster rate, and by Jan. 1, 1924, was reported at about 1,250,000, from a little more than one-third of that number re-

corded at the beginning of the year. This apparent paradoxical condition is accounted for by the growth of industries during 1923. Increasing industrial activity created a returning tide of skilled workers, which ebbed away during the communistic régime and became scattered among the home handicrafts, the villages, peddling (the so-called "bagmen"), etc. The heavy slump in the prices of agricultural produce on the one hand, and the rise in wages of factory workers on the other, all stimulated the drift of labor to the cities. From an average wage of the Russian worker amounting to 33 rubles in 1913, the monthly wage fell to 9 rubles in 1918, and as low as 6.7 rubles per month in 1919. This rate of wages was obviously insufficient for subsistence. During these years the workmen systematically expended more than they earned, eking out their wages by all manner of illegal practices, petty pilferage, speculation, outside work, etc. By September, 1923, according to the data of the Central Statistical Bureau, the average wage of the Russian worker in the manufacturing industry reached 11 rubles per month, of which 1.80 rubles were received in kind In all the mining and metallurgical industries the average wage rate in September, 1923, was 8.90 rubles, with 2.20 rubles in kind In the coal-mining industry specifically the average wage was 8.50 rubles. Compared with pre war earnings the average monthly wage rates in October, 1922, and September, 1923, in percentages of the average rates of 1913, in various industries, are represented as follows:

PERCENTAGE OF 1913 WAGE RATES		
Industry	October, 1922	September, 1922
Metal working	30 1	48 7
Woodworking	34 8	58.0
Glass, china, cement	30 4	55 8
Chemical	53 6	93 2
Foodstuffs	79 0	158,6
Leather	50 8	76.6
Textile	32.8	65.5
Paper	51.1	93 8
Printing trades	58 9	89.5
Average, manufacturing industries	36 7	67.9

Thus in all the branches of the manufacturing industries a substantial increase in wage rates was recorded during 1923. Actual wage receipts, however, fell about 25 per cent short on the average of payments due. In the coal-mining industry, on the other hand, the wages decreased from an average of 9.50 rubles per month in October, 1922, to 8.50 rubles in September, 1923.

Foreign Trade. Foreign trade in Soviet Russia is a state monopoly and is carried on by the Commissariat of Foreign Trade through various official institutions and branches within the Soviet Union, which are represented by foreign trade delegations abroad, chiefly at Berlin and London, and by corporations organized under the laws of the respective countries in the form of commercial companies, whose entire stock, however, is held by the Soviet government. With the expansion and ramification of foreign trade operations, it became impossible for the central Commissariat to handle the entire volume of trade, and a system of licensing the largest commercial and industrial bodies to carry on their trading operations independently of the Commissariat was resorted to. During the year 1923, several private concerns also were authorized to carry on the foreign trade within certain limitations as to the nature and the outside amount of imports permissible and subject to an equal division of all profits with the Soviet government. Until the year 1923, the trade balance was heavily adverse, due to Russia's inability to produce sufficient surplus for export, especially of grain, which formed the bulk of pre-war exports. With the satisfactory crops of 1922 and 1923, however, exports of grain were resumed, and along with the severe restrictions of imports they enabled the government to close 1923 with a favorable balance. In the following table, tracing the volume of imports and exports during pre-war years and since 1920 (foreign trade was practically suspended during the years immediately following the Revolution), the entire volume of trade is figured in gold rubles at 1913 prices. This figuring is rendered necessary by the failure of the rapidly depreciating Soviet currency to furnish a stable medium for calculating a comparison.

Years	Imports	Exports
Average 1909–13	1,139,654,000	1,501,421,000
1913	1,374,034,000	1,520,135,000
1920	28,000,000	2,400,000
1921	210,003,000	20,195,000
1922	269,799,000	81,620,000
1923	144,056,000	205,818,000

Thus the favorable balance of trade obtained in 1923, the first under the Soviet régime, amounted to 61,672,000 rubles. On the basis of approximate current prices instead of 1913 prices, the exports totaled 307,300,000 rubles and the imports 200,100,000 rubles; this made the favorable balance, on a contemporary basis, equal roughly to 107,200,000 rubles. In addition to commercial imports, famine relief supplies to the value of 34,400,000 rubles were imported during the calendar year, as against similar imports of 183,800,000 rubles during the calendar year 1922. The imports underwent a change in composition. Whereas over one-third of the imports of 1922 consisted of foodstuffs, exclusive of contributed famine relief supplies, the imports of foodstuffs in 1923 amounted to but 7.4 per cent of the total. In 1922 the imports of raw materials and semimanufactured products represented only 14 6 per cent of the total, whereas in 1923 this group accounted for 44.2 per cent of the total At the same time exports showed a corresponding shift: for the group of foodstuffs, from 5 3 per cent in 1922 to 56.8 per cent in 1923; for raw materials and semifinished goods, from 90 8 per cent to 42 4 per cent of total. The general distribution of Russian exports in 1923 by groups of commodities is thus found to be closely approaching that of 1913, when foodstuffs accounted for 52.2 per cent of total exports, and raw materials and semifinished goods accounted for 36 9 per cent, these two groups comprising the bulk of Russian exports. The similarity is extended further to the two principal markets of Russian foreign trade, Germany and the United Kingdom. In 1913 these two countries accounted for 60.1 per cent of total Russian imports, and 47 4 per cent of total exports; in 1923, their share was 60 and 44.2 per cent, respectively. The government monopoly of foreign trade was firmly maintained. According to data for the operating year 1922–23, Soviet state institutions, including government organizations and mixed companies controlled by the Soviet government, ac-

counted for 96.7 per cent of all exports and for 97.3 per cent of all imports; the rest represented the part played by purely private initiative in the foreign trade of Soviet Russia.

Finance and Currency. The process of currency inflation and depletion of the gold stock in Russia started soon after the outbreak of the War. The Imperial régime, however, increased the outstanding notes only moderately and did not differ in this respect from the inflation policy prevailing in almost all belligerent countries. Shortly after the outbreak of war, the statutory restriction which provided that the paper money issued by the Imperial Russian Bank should not exceed its gold reserve by more than 3,000,000,000 rubles was abolished, and the right to convert paper rubles freely into gold was abrogated. On July 27, 1914, the outstanding notes amounted to 1,633,000,000 gold rubles and were covered by 1,744,000,000 gold rubles, a reserve of 107.4 per cent. During the three years and four months between the outbreak of war and the inauguration of the Soviet régime, the paper in circulation increased over clevenfold. The Soviet decree of July 25, 1918, made "the purchase, sale, or possession of precious metals in bullion or gold punishable by imprisonment of not less than 10 years in hard labor and the confiscation of the entire property of the culprit." The only currency authorized was the Soviet paper ruble, not backed by any reserve or security but circulating by virtue of its acceptance by all government institutions, trusts, and trading-stores. With the inauguration of the "new economic policy" and the legalization of private trading, the Soviet ruble began to depreciate rapidly. When trade with the outside world was resumed, involving purchases on a large scale from the peasantry and the concomitant exhaustion of the gold reserve appropriated by the Soviet government, heavy budget deficits began piling up; these were met by more issues of paper money, and inflation assumed gigantic proportions.

The decree of Oct. 17, 1920, designated the possession of gold, silver, platinum, foreign exchange, etc., as legal, but subject to compulsory delivery to the state against a compensation fixed by the Commissariat of Finance according to average market value. All transactions in valuables or currency were still completely prohibited. The decree of Nov. 18, 1921, granted to the State Bank the monopoly of purchase and sale of foreign currency and precious metals in coin and bullion. From this indirectly followed the right to sell money or valuables to the State Bank but not to purchase them from the Bank. The decree of Apr. 4, 1922, abrogated the principle of compulsory delivery to the state of property in precious metals or foreign exchange; but it permitted the free circulation of precious metals in the form of bullion only, leaving in force the monopoly of the State Bank on the purchase and sale of coin and foreign exchange. By decree of July 27, 1922, state and coöperative institutions were permitted to accept gold or precious metals in coin in payment for goods or services, provided immediate deposit thereof was made to their accounts with the State Bank.

In December, 1922, the issue of so-called "chervonets" banknotes by the State Bank was authorized; these eventually became standard currency. These notes of 10-ruble denomination were secured according to law by gold, silver, and stable foreign exchange, to the extent of not less than one-quarter of face value, the balance being covered by drafts, notes, warehouse receipts, and other transferable collateral. However, ever since the inception of its note issue the State Bank has maintained the gold security in reserve of the chervonets notes at 50 per cent of face value. The decree of Jan. 29, 1923, abolished the monopoly of the State Bank on purchase and sale of foreign currency and admitted trading in gold and silver bullion, in foreign currency, and in checks and bills of exchange. The chervonets notes have retained their parity with the gold ruble in terms of Soviet currency and circulate at par with the pound sterling and practically so with the dollar. At the same time, the sound or purchasing value of the entire mass of paper ruble currency outstanding was dropping precipitously. On Jan. 1, 1923, it was estimated at 101,900,000 gold rubles; on June 1 at 88,702,000; on Jan. 1, 1924, at 59,500,000; and on February 1 at only 39,000,000 rubles. The total Soviet paper money in circulation on Jan. 1, 1924, was about 178,000,000,000,000,000 rubles. Of this astronomical amount, 31,000,000,000,000,000 had been issued in October, 45,000,000,000,000,000 in November, and 80,000,000,000,000,000 in December. By Jan. 1, 1924, chervonets banknotes assumed a predominant position as a medium of exchange. A series of decrees promulgated during the last week of February and during March, 1924, introduced a reform in the Russian monetary system. By a decree effective on February 15, the Soviet paper ruble was abolished, and the chervonets banknote was made standard currency. By the second and third decrees issued on February 29 to regulate application of the first decree, the system of reckoning in index rubles based on 1913 prices was abolished, and the payment of fixed wage rates in chervonets rubles was substituted for their payment in Soviet currency, as based on the cost of living index. On Mar. 10, 1924, announcement was made that Soviet paper currency would be redeemed for chervonets notes at the rate of 500,000 rubles of 1923 issue (each of which is equal to 1,000,000 original Soviet rubles), for one chervonets ruble. Treasury bills of 1, 3, and 5 ruble denomination were put in circulation instead, not backed by any security but exchangeable for chervonets notes at any of the state-controlled banks. In addition, silver and copper coin was put in circulation. By May 1, 1924, there were issued 87,000,000 rubles of the new Treasury bills, 20,000,000 rubles of silver, and 3,000,000 rubles in copper, a total value of 110,000,000 rubles of fractional currency; the amount of chervonets banknotes in circulation rose to 305,000,000 rubles, making a total of 415,000,000 rubles in circulation, with the fractional currency amounting to about 25 per cent of the total as against 40 per cent prior to the War.

The budget of 1922 (nine months, January-September) was balanced with a deficit of 139,000,000 rubles, covered entirely by the issue of fiat currency. The budget of 1922–23 was balanced with a deficit of 572,000,000 chervonets rubles, only partially met by the issue of 390,000,000 rubles of fiat money and 129,000,000 rubles of various short-term loans and by the sale of foreign currency held by the State Bank. The budget estimate for 1923–24 passed at 1,708,000,000 chervonets rubles and an estimated deficit of 432,000,000 rubles. To cover this de-

ficit, about 180,000,000 rubles of Treasury bills were to be issued, and the balance was to be met by short-term loans, increased taxation and greater income anticipated from nationalized properties and railroads. Bank deposits increased nearly tenfold during 1923, from 21,980,000 chervonets rubles on Jan. 1, 1923, to 216,080,000 on Jan. 1, 1924.

Transportation. The following data on railroads for pre-war years cover the entire Russian Empire and should be reduced by 15 to 25 per cent for comparison with the 1924 territory. Main-track mileage at the end of 1914 was 43,850 miles, of which 6330 were in Congress Poland and the Baltic Succession States. The mileage in 1922 within Soviet boundaries was 42,357 miles

Condition of Rolling Stock. The number of locomotives at the beginning of 1914 was 20,057, with an average of 15 per cent under repairs. In September, 1923, the total number was 19,642, of which 8576 were sound and the rest disabled. Number of freight cars in 1913–14: 550,000; in September, 1923: 414,950; of these, 290,540 were in sound condition The number of passenger cars in September, 1923, was 24,165, of which 12,760 were disabled. Total work of railroad transport in 1913, including freight trains, railroad service trains, and military transport trains, was expressed in 46,065,000,000 ton miles and 18,120,000,000 passenger miles. During the 1922–23 operating year, traffic amounted to 16,470,000,000 ton miles, of which 9,787,000,000 ton miles represented paid goods traffic; passenger traffic amounted to 9,026,000,000 passenger miles. Average daily loadings of cars amounted in 1914 to 75,000, in 1921 to 10,900; in 1922 to 9770; and in 1923 to 11,821. Thus the average load factor of the freight traffic was a little over one-third of the pre-war figure, but this was very unevenly distributed so that on the trunk railroads in the central parts of Russia the load factor reached and even exceeded one-half of that of 1913. In the outlying regions, as Siberia and the North, the load reached barely 10 to 20 per cent of pre-war. This necessitated the support of the poorly-loaded lines at the expense of those more actively exploited.

Condition of Trackage. The campaign of systematic introduction of four standardized types of rails on the Russian railroads had not been completed by the time the War broke out. Consequently a diversity is found in regard to weight of rails, even within trunk lines of the same system. As the replacing of rails by heavier types had been lagging behind the replenishment of motive power by new locomotives, the 1924 condition of track did not correspond to the demands imposed by traffic. The heavier rails in service in 1924 were from 13 to 16 years old, while the lighter types had been in service from 40 to 50 years, with an average service limit of 33 years under pre-war conditions of traffic. The status of rail fastenings, spikes and bolts, was even worse. Such a condition of the roadbed made it continually imperative to reduce the speed limit of trains. The official programme of trackage improvements provided for replacement of 140,000 tons of rails during the first year, 1922–23. On account of conditions in the steel industry, only about 85,000 tons were provided during that time; hence, the replacement programme will have to be considerably extended.

Railroad Personnel, Wages, and Receipts. In the middle of 1921 the number of railroad employees was 1,256,767; on Jan. 1, 1922, it had been reduced to 907,000; on Jan. 1, 1923, to 708,000; but by Oct. 1, 1923, it had risen again to 900,398. The number of men employed per mile of track amounted in January, 1921, to 30; in January, 1922, to 22; in January, 1923, to 17.3; in October, 1923, to 21.4; the monthly average in 1913 was 19.35. In October, 1922, the wages of railroad workers in Russia averaged 6.63 gold rubles (index basis) per month (1 ruble = $0.5146); in March, 1923, 9.65 rubles; in the following June, 9.80 rubles. The increase of wages was especially noticeable in the railroad workshops, where it reached almost the average wage of a metal worker in Soviet Russia, 14 rubles per month. Railroad workers still remained the lowest-paid form of labor in Russia. By June, 1923, their average wage still amounted to only 43.3 per cent of pre-war levels, whereas the comparative rate for industrial workers reached 57.5 per cent. Prior to the War the earnings of railroad labor averaged about 50 per cent above those of industrial labor, 36 rubles per month, as against an average of 20 rubles for industrial labor. The gross receipts of railroads for the 12 months ended Sept. 30, 1923, amounted to 205,000,000 gold rubles on the index basis. During the same period state subsidies to the railroads totaled 86,000,000 rubles, while the total subsidies granted during the year to the State Transport Service as a whole, i.e. including water transport, etc., amounted to more than 126,000,000 index rubles, or expressed in actual chervonets or gold currency, to 157,000,000 chervonets rubles. This sum represented almost one-third of the entire budget of the entire Transportation Service.

Internal Waterways. The length of navigable mileage in European Russia amounts to 25,545 miles and in Asia to 30,100 miles, besides longer mileage suitable for rafting purposes only. The river fleet in 1913 within the 1924 Soviet borders consisted of 3925 power-driven cargo boats of 682,528 aggregate indicated horse power; 20,573 sailing and other vessels, with a total capacity of 12,907,000 long tons. In 1923 there were 716 power-driven vessels of 187,120 horse power, including 150 oil tankers of 72,180 horse power, 314 passenger steamboats of 102,786 horse power, and 2408 sailing and other vessels of a total capacity of 2,316,000 long tons, including 366 oil barges of 1,025,000 tons capacity. The volume of river transport in 1913 was 44,364,000 long tons and 11,041,300 passenger; in 1923, 10,218,000 tons, including 3,038,000 tons of oil cargo and 8,087,185 passenger

Merchant Marine. In 1914 there were 1005 steamships, averaging 826 tons gross registry, of average capacity of 487 tons; 55 motor-driven vessels of 380 tons deadweight average, and 238 tons average capacity.

History. The outbreak of the War in August, 1914, produced a mighty demonstration of Russian Pan-Slavism. Internal dissensions and strikes were submerged in a wave of patriotism. The Duma, usually so critical, rallied to the support of the Czar, and the representatives of dissentient nationalities made striking asseverations of loyalty. All Russian political groups, with the exception of the Bolshevist wing of the Social Democratic party, expressed their resolution to spare no effort in assisting the government to maintain the country's integrity and dignity and to defend coreligionists and kins-

MERCHANT MARINE, 1922

Distribution	STEAM-DRIVEN Number	STEAM-DRIVEN Capacity (Long tons)	SAILING AND MOTOR-DRIVEN Number	SAILING AND MOTOR-DRIVEN Capacity (Long tons)
Baltic Sea	116	69,050	14	6,630
White Sea	338	7,710	243	24,350
Caspian Sea	207	153,630	87	57,145
Black and Azov Seas	331	50,270	90	5,900
Total*	992	280,660	434	94,025
Average capacity		282		216

*There were, in addition, 560 barges and lighters. The principal ports were as follows: on the Baltic Sea, Petrograd; on the Black Sea, Odessa, Batum, Nikolaiev, Novorossiisk, and Marioupol; on the White Sea, Archangel, on the Caspian Sea, Astrakhan; and on the Arctic Ocean, Murmansk.

men abroad. Even leading anarchists espoused the national cause with spontaneous enthusiasm. The government on its side made some attempt to conciliate discontented minorities. The struggle with the Finnish Diet was suspended; the Poles were promised, by proclamation of the generalissimo, Grand Duke Nicholas, a grant of early autonomy and ultimate reunion under the Russian sceptre with their fellow-nationals of Germany and Austria; and restrictions on Jews, Catholics, and Lutherans lapsed temporarily. The permanent abolition of the sale of vodka decreed shortly after the beginning of hostilities met with widespread popular support. Large social groups were organized to aid in the prosecution of the war: local provincial councils formed the All-Russian Union of Zemstvos, and Municipal Councils were similarly federated into a national society. These bodies rendered invaluable service in auxiliary relief work, although continually hampered by a suspicious and jealous attitude on the part of the national government. The dynasty had been given a unique opportunity to retrieve its misdeeds and blunders by placing itself wholeheartedly at the head of a great popular movement. But unfortunately Czar Nicholas II, although well-meaning, was perversely narrow-minded and weak. Surrounded by reactionary nobles, priests, and bureaucrats, he "utilized the temporary heat of national altruism and patriotism in order to forge enduring iron links in the chain of social inequality and political absolutism."

The Russian invasion of East Prussia met with an overwhelming catastrophe in the battle of Tannenberg, but simultaneously Russian arms gained signal successes against the Austrians in Galicia. Reform in Poland was delayed while reactionary and ultranationalistic officials devoted themselves to energetic measures for Russifying conquered Galicia. During the winter of 1914–15, although the Russians held their own on the eastern front, they showed few signs of sweeping like a "tidal wave" on Berlin or Vienna, as optimistic Allied publicists hoped. At the opening of the Duma in February, 1915, Premier Goremykin expressed unwavering confidence in ultimate victory, and the majority of the legislature seemed to share his faith. Meanwhile, the Russian foreign minister, Sazonov, had taken diplomatic measures to insure the realization of Russia's great ambition, the acquisition of Constantinople. The Czar's government hailed with positive delight the opportunity afforded to declare war on Turkey (Oct. 31, 1914). On Nov. 14, 1914, the British Ambassador at Petrograd informed Sazonov that Russia might have Constantinople, and during the following March (1915) a secret arrangement was consummated with France and Great Britain whereby Russia was also to get the whole of Turkey in Europe except a district around Adrianople and Kirk-Kilisse; the Asiatic shores of the Bosporus; and about 80 miles of the Black Sea coast in Asia Minor, all in return for according the British and French like satisfactions in other regions. At that very moment an Anglo-French expeditionary force was engaged in trying to force the Dardanelles in response to a Russian plea for a relief of pressure on the Caucasus front, where the Turks had concentrated their main strength. Russia failed to cooperate with her Allies in that tremendous undertaking, so vital to her interests and so essential to Entente victory. And with what now appears to have been consummate folly, fathered by greed, the Russian cabinet definitely vetoed the plan to obtain Greek military aid in opening the Straits; the Greeks, so Petrograd feared, might preëmpt Constantinople. The débâcle which eventuated had a direct causal effect on Russia's subsequent collapse, since it deprived her of a line of communications which, if kept open, would have facilitated the shipment of supplies and munitions to her poorly armed legions. In a struggle of machinery and specialized technical equipment such as the War was proving, Russia was ill-prepared for battle; a land of primitive agriculturists, in a semifeudal society, geographically cut off from assistance, she lacked the requisite resources and industrial organization.

The year 1915 had opened rather brightly for Russia. To be sure, the government was experiencing great financial difficulties, due to the loss of revenue entailed by the abolition of the government monopoly of the sale of vodka and to the stupendous expenditures for military purposes, but France and Great Britain lent valuable assistance in sustaining Russian credit, and a large loan was floated in America. In the spring and summer of 1915, despite the intervention of Italy, the armies in the West being deadlocked, a gigantic Teutonic force was concentrated on the eastern front, and the Russians suffered a series of disastrous defeats. Russian generals, several of whom had conspicuous ability, were grievously handicapped by intolerable social and economic conditions. Russia's illiterate peasant armies, valorous in the extreme but woefully short of munitions and supplies, could not cope on equal terms with the disciplined troops of the Central Powers. Mere numbers availed nothing against superior and overwhelming machine-guns and howitzers. During May and June, General von Mackensen, with combined Austro-Hungarian and German armies, expelled the Russians from Galicia; immediately thereafter General Hindenburg, the erstwhile victor of Tannenberg, directed a mighty thrust at Russian Poland. By October, 1915, all of Poland, together with most of Lithuania and Courland, was in the hands of the enemy powers, and the military prestige of Russia was destroyed. Up to October, 1915, Russia had lost approximately 2,500,000 men: 500,000 dead,

1,000,000 wounded, and 1,000,000 taken prisoner,

The Meeting of the Duma. The reverses in the field had profound repercussions on political life. Patriots assailed the government for its criminal inefficiency and accused leading generals of incompetence. An early session of the Duma and the selection of a really representative national ministry were demanded. Premier Goremykin made some concessions to the critics. He superseded his unpopular Minister of the Interior, Makarov, by the more liberal Prince Cherbatov. On June 25, the scoundrelly Sukhomlinov resigned the war portfolio and was replaced by General Polianov. Other reactionaries were dismissed and more acceptable conservatives appointed to succeed them. These changes postponed the impending crisis, but the situation was serious in the extreme when the Duma reassembled on August 1. The Duma, while expressing fervent loyalty and patriotism, demanded that the government collaborate with the people in a more democratic spirit Goremykin promised fuller coöperation in the work of national defense and planned to create advisory boards including experts and delegates from the Zemstvos, Municipal Councils, the Duma, and the Council of the Empire, to assist the ministers of war, commerce, communications, and agriculture The Duma liberals, aroused by amazing revelations of treason and corruption in the government and army circles, demanded greater reforms. In late August and early September, 1915, under the leadership of the Constitutional Democrat, Milyukov, a bloc of liberal and moderate groups was constituted, embracing all elements in the Duma except the extreme reactionaries and nationalists on the Right and the extreme radical Social Democrats on the Left. The programme of the bloc involved: (1) the reconstruction of the ministry on a more representative basis; (2) the reconciliation of discontented nationalities and aggrieved social classes; (3) the reform of local administration; (4) punishment of delinquent commanders and officials; and (5) the vigorous prosecution of the war. Simultaneously (September 5), the Czar with a magnificent gesture assumed nominally supreme command of the army, and Grand Duke Nicholas was transferred to the Caucasus.

After the German drive had spent its vigor, reaction triumphed over reform. To the consternation and anger of the Liberals, an imperial decree unexpectedly prorogued the Duma (September 16). In October, Khovostov from the extreme Right in the Duma replaced Cherbatov as minister of the interior, with the avowed purpose of strengthening the machinery of "benevolent but firm authority." One ministerial change followed another during the autumn and winter, until on Feb. 1, 1916, "the very acme of reaction was reached with the retirement of Goremykin and the succession of Boris Stürmer, an ultraconservative and an oppressive landlord reputed to be pro-German in his personal sympathies"

The Sturmer Ministry. The opening days of the new administration were signalized by important Russian victories in Asia Minor, including the capitulation of the great Turkish stronghold of Erzerum (February 16). The Duma, reconvened on February 22, was honored for the first time by the personal attendance of the Czar. Nevertheless, relations with the ministry continued critical and controversial. Finance occasioned a sharp debate; an income tax was levied, and recourse was had to British, French, and American loans. Liberal groups denounced the government for its failure to establish a greater measure of political liberty and for its harsh treatment of Finns and Poles. There was also a disorderly debate on the continued persecution of the Jews. New changes in the ministry followed these attacks. Khovostov and Polianov resigned the interior and war portfolios respectively, and General Sukhomlinov, the ex-Minister of War, was imprisoned for treasonable negligence in conduct of his office Meanwhile Russia's military fortunes were appreciably reviving. During the winter of 1915–16 Russia's lines were reformed, her arsenals replenished, and her command reorganized. In the summer of 1916 she coöperated with her allies in a series of coördinated offensives. Under General Brussilov, the Russians inaugurated a vigorous drive along the Sereth River at the beginning of June. By the middle of August, the entire province of Bukovina had been conquered and some 350,000 men taken, together with enormous stores of equipment. Russia's sudden rise, "phoenix-like, from the disastrous fire and flame of the preceding autumn, reassured all the Allies." It contributed to Allied successes in the West, and it was the chief factor in encouraging Rumania to enter the War on the side of the Allies (August, 1916). Russia, however, consented with ill grace to Rumanian demands for future compensation and subsequently displayed short-sighted duplicity in neglecting to aid her southeastern neighbor and ally against the terrific Teutonic onslaught Meanwhile, the internal situation in Russia had grown truly alarming, for the recovery of the army from its defeats and demoralization in 1915 was not accompanied by a restoration of political confidence and stability at home The Czar and his advisers had learned no lesson. They persistently ignored the symptoms of economic distress palpably manifest throughout the empire and gave no consideration to widespread popular demands for political reform. Against the Stürmer ministry a mass of grievances speedily accumulated. The premier muzzled public opinion, forced the resignation of the able and patriotic Sazonov (August, 1916), appointed extreme reactionaries to office, prorogued the Duma from July 3 to November 14, promulgated obnoxious autocratic decrees, and endeavored to repress popular organizations (especially the All-Russian Union of Zemstvos, the Union of Municipalities, and the War Industries Committee), formed to promote popular cooperation with the government and to assist in the vigorous prosecution of the war. On October 4, Stürmer ordered all meetings of these organizations to be placed under police surveillance and entrusted the administration of the interior to Protopopov, the most zealous prosecutor of liberals in all Russia and a pro-German into the bargain.

The Trepov Ministry. These measures aroused a storm of protest and united all factions against the government. Shortly after the Duma met (November 14), Stürmer resigned, only to be succeeded by a reactionary of the same stamp, Alexander Trepov The Duma did not relax its criticism. In the midst of a stormy session during the closing days of 1916, Professor Milyukov, leader of the Constitutional Democrats, vehemently assailed the government, being supported by several other speakers who

made sensational disclosures concerning the almost traitorously inefficient prosecution of the war. The Duma, the Imperial Council, and the Council of Nobles, all passed resolutions excoriating the "dark forces" tending to paralyze the national organism and to create confusion in all departments of the government. "Autocracy of the Russian variety proved itself absolutely unfit to meet the supreme test of the Great War." Despite the alarming spread of popular disaffection during the winter of 1916–17, the government adhered to its traditional methods of secrecy, suspicion, repression, and intrigue. The Czar was hopelessly dominated by his consort, Czarina Alexandra Feodorovna, and she in turn was under the hypnotic influence of fools, hypocrites, and charlatans, especially the notorious Gregory Rasputin. "Rasputin (meaning 'dirty dog'), a curious compound of shrewd peasant, avaricious politician, erotic maniac, and religious fanatic, acted as official 'medicine man' to a superstitious court and gave tone and character to the blind, perverse autocracy." Friend of Goremykin, Suhkomlinov, Stürmer, and Protopopov, with whom he coöperated to frustrate nascent liberalism and constitutionalism, he exercised such a baleful influence on the course of events that his assassination at the end of December, 1916, caused much rejoicing. It was a grim portent of immanent revolution. The situation at the opening of 1917 was extremely tense and abnormal. The armies at the front sullenly maintained their positions but were war-weary and distrustful of their leaders. "The factory workers in the towns were deeply affected by internationalistic and socialistic ideas, while the peasants were groaning under the heavy toll of conscription and the economic demands arising from a war which they had ceased to understand. Among the intellectuals there was a widespread feeling of uneasiness as regards the coming catastrophe. . . . But the prevailing sentiment was despair as to any improvement in the reactionary government."

The Golitzin Ministry On Jan. 9, 1917, Prince N. Golitzin, "a typical bureaucrat with compressed brains and elastic conscience," replaced General Trepov as premier. Other reactionary appointments followed, and the reopening of the Duma was deferred from January 25 to February 27. The government was openly charged with aiming "to provoke a futile rebellion, to suppress the rebellion by force, to quell by terrorism an agitation for reform, and to entrench Russian autocracy anew in power for another century." On February 25, a secret arrangement was concluded with France whereby Russia was to get a free hand in drawing her western frontiers, i.e. around Poland, in return for the granting of a similar freedom to France along the Rhine. This devious diplomacy was nullified by the subsequent course of events. A grave shortage of food in Petrograd and other cities was accentuated by the mismanagement and corruption of the government. The Duma reconvened on February 27, amid overawing police guards. Workmen to the number of 100,000 in Petrograd and 25,000 in Moscow went on strike as a political manifestation on behalf of the Social Democrats. The food crisis became acute. Bread riots occurred. On Mar. 11, 1917, the Czar's government ordered the Duma and the Council of the Empire to dissolve and the workmen to return to their jobs. The workers refused to obey, and the Duma declined to disband, declaring that it was now the sole constitutional authority in Russia. The Revolution was at hand.

The Revolution and the Provisional Government. After several days of critical uncertainty, the Petrograd garrison was won over, the organs of autocracy ceased to function, and the Revolution spread with lightning speed to the armies in the field and to distant provinces. The forced abdication of the Czar (March 15) in favor of his brother the Grand Duke Michael, and Michael's refusal to accept the crown unless it were proffered by the will of the people, ended the three-century rule of the Romanovs. In Petrograd authority was divided between the Duma and a newly constituted Soviet (Council) of Workingmen's and Soldiers' Delegates. By an agreement between them, a thoroughly respectable bourgeois provisional government recruited from the Duma and responsible to it was established under the premiership of Prince George Lvov, a liberal landlord, president of the Union of Zemstvos and member of the Constitutional Democratic party. His ministry embraced seven other members of his party, including Milyukov as foreign minister, three Octobrists, including Guchkov, who held the war portfolio, and one Social Revolutionary, Alexander Kerensky, as Minister of Justice.

The provisional government was speedily recognized by foreign countries. With equal celerity, the policies of the discredited autocracy were reversed. Finland's constitution was restored; the Poles were promised unity and self-determination; and the Jews received a sweeping bestowal of equal rights. Thousands of political offenders were released from prison or recalled from exile. Freedom of speech, of association, of the press, and of religion were proclaimed, and it was announced that a National Constituent Assembly would shortly be designated by universal suffrage to frame a permanent popular constitution for Russia. The new ministry advocated a thoroughly democratic régime for revolutionized Russia, but "unlike the democracies of western Europe, the Russian revolutionary movement would have to base itself less on an electorate of educated bourgeois and prosperous independent farmers than on a mass of illiterate, poverty-stricken peasants, and on noisy groups of ill-disciplined urban workers," for Russia was politically, economically, and socially the most backward country in Europe. Moreover, the great mass of peasants and proletarians were not satisfied with promises of political democracy and individual liberty; they desired a far-reaching social and economic transformation. More representative of the bulk of the Russian people than the bourgeois provisional government were the extra-legal Soviets of Workmen's, Soldiers', and Peasants' Deputies, which, modeled on the initial Petrograd organization, were constituted throughout the country and in the army. The first National Congress of Soviets held at Moscow (April, 1917) demanded fundamental agrarian reform, the participation of workmen in the management of industry, the democratization of the army, and the continuance of belligerency only on the basis of a peace programme involving "no annexations and no indemnities."

There was a wide gulf between these aims of the Soviets, which were dominated in the rural regions by Social Revolutionaries and in the

towns by the Menshevist faction of the Social Democrats, and those of the middle-class government of Lvov. The latter desired to subordinate internal reforms in Russia to the vigorous prosecution of the War. Milyukov, as minister of foreign affairs, adhered to the diplomatic traditions of the old régime, favoring the firm maintenance of national prestige, cordial and consistent coöperation with the Allies, and the complete realization of imperialist aims as embodied in the secret treaties The demobilization of the army, the immense wave of war-weariness among the mass of the people and the hostile attitude of the Soviets, forced the resignation of Milyukov, Guchkov, and other moderately conservative ministers, and on May 16, 1917, the Ministry was reconstructed along more radical lines, Kerensky as Minister of War becoming the dominant figure, overshadowing Premier Lvov. In the ministry were seven Constitutional Democrats, two Octobrists, three Social Revolutionaries, and three Menshevik Social Democrats.

The Kerensky Government. Kerensky made strenuous efforts to terminate the War successfully, while simultaneously endeavoring to assure both political democracy and social reform. But although extremely eloquent and well-intentioned, the new leader lacked statesmanlike prevision, clearness of purpose, and strength of will. "After attaining to a unique position at the head of revolutionary Russia, Kerensky entangled himself in a net of contradictory measures, of ill-judged assertions of authority and of weak-minded compromises and renunciations." His ministry encountered the opposition of Constitutional Democrats who feared anarchy, of the Bolsheviists who were growing more influential in the Soviets, and of German emissaries fostering separatism among the subject nationalities and pacifism among the soldiers, workmen, and peasants. He was unable to secure a repudiation by the Allies of the obnoxious secret treaties or a restatement of war-aims on the basis of "no annexations and no indemnities" Under the circumstances it was impossible to infuse patriotic enthusiasm into the Soviets, and the disintegration of discipline in the army led to disastrous defeat during the attempted Brussilov offensive of July, 1917. All the gains of 1916 were obliterated in one crowning catastrophe, and the Germans extended their lines in the Baltic provinces. The Austrians recovered all of Galicia.

Even more alarming than these defeats at the front was the continued growth of internal chaos. Although numerically speaking, it was a mere insignificant minority of the Russian people, the extreme faction of Bolshevists which had consistently opposed the War since its very outbreak, began in the spring of 1917 to acquire immense prestige among the war-weary masses who were more eager for the social millennium than for military victory. The Bolsheviks adhered to their principles in frankly repudiating political democracy and refusing to coöperate with the bourgeoisie or even with the Social Revolutionaries and Mensheviks in the hour of supreme national crisis. This subversive propaganda was facilitated by the return of a long-exiled leader, Nikolai Lenine (the pseudonym of Vladimir Ulianov), a man of noble extraction who had become a "doctrinaire socialist of the dogmatic type" with an international reputation. Lenine's chief accomplice in his formidable assaults on Russian society and the provisional government was a fanatical ex-Menshevik, Leon Trotsky (a pseudonym for Bronstein), a man of middle-class Jewish origin, who had likewise been a political exile and who returned to Russia in May, 1917. The Bolsheviks vociferously agitated for peace, outlined a temptingly utopian programme of immediate social reforms including expropriation of the landed nobility and industrial self-government, and made their slogan "All power to the Soviets." In June, at the All Russian Congress of Soviets assembled in Petrograd under the presidency of the Menshevist leader Tcheidze, Lenine pronounced a furious indictment of the provisional government and of Kerensky. His attack was unavailing, however, and he was overruled by the moderates. Following the collapse of the Russian offensive in July, Prince Lvov and the other Constitutional Democrats in the ministry resigned (July 17). A Bolshevist uprising was repressed by Kerensky with the aid of the Menshevist Petrograd Soviet, Lenine fleeing to Finland where he remained until October. On July 20, Kerensky became head of the provisional government. He still hoped to save Russia, but the odds were against him. An extraordinary conference representing various parties, the Zemstvos and municipalities, universities, the army, factory workmen, and peasant communities, which met in Moscow late in August, revealed a state of complete paralysis and confusion among the leaders of the country. In September, Kornilov, who had succeeded Brussilov as generalissimo, attempted to assume a military dictatorship, after concerting plans to that effect with Kerensky, but the latter turned against him and took control of the army. This affair caused a recrudescence of revolutionary zeal and a violent rush to the Left. Meanwhile anarchy increased in everyday life. The peasants were seizing the large estates, dividing the spoils, and executing summary justice on those who had long oppressed them; urban workmen were dispossessing factory-owners. The Soviets called a Democratic Conference in Petrograd on September 27, to represent peasants and proletarians but no bourgeois elements. All proposals for a new and more capable coalition government failed.

The Bolshevist Revolution. The weakness of the government was the strength of the Bolsheviists. Gradually, they supplanted the Mensheviists in control of urban Soviets, and by promising speedy agrarian reforms, i.e. confiscation of land, they weaned the peasants away from the Social Revolutionaries and Kerensky. Trotsky, imprisoned after the July fiasco, was subsequently released, only to succeed the Menshevist president of the Petrograd Soviet and to renew his subversive activities by organizing Red Guards subservient to Bolshevist wishes. During October Kerensky made one last effort to bolster up his government by establishing a Council of the Republic with a membership drawn from all the political parties, principal associations, and institutions. It was of no use; the day of reckoning had come. The provisional government had failed to fulfill popular aspirations or to overcome the force of opposition. "The time seemed ripe for a Bolshevist revolution and for the establishment of a dictatorship of the proletariat." By extravagant promises of peace and an earthly paradise, by irresponsible attacks on the much-harassed government, and by

the use of traditional political methods of intimidation and intrigue, the Bolshevists managed to control a large majority of the delegates newly elected to the Congress of Soviets. Having formed a Military Revolutionary Committee and assured themselves of the support or benevolent neutrality of the Petrograd garrison, the Bolshevists utilized their Red Guards to execute a coup d'état (Nov. 6–7, 1917). Kerensky had provided no adequate defense, and the conflict was brief. The members of the provisional government were taken into custody, Kerensky alone evading capture. On November 8, the change was formally recognized by the All-Russian Congress of Soviets, which immediately sanctioned the establishment of a Council of People's Commissars with Lenine as premier and Trotsky as Commissar for Foreign Affairs.

In full accordance with the anticapitalist tenets of their faith, with the anti-imperialist pronouncements of the Zimmerwald manifesto of 1915, and with their promises to the benighted and war-weary masses, the Bolshevists resolved to conclude peace with the Central Empires at any price. Proposals to the Allied governments for the immediate conclusion of an armistice and the restatement of war-aims on the "no annexations, no indemnities" basis eliciting no answer, the Bolsheviks enraged the Entente rulers by publishing the "secret treaties." An armistice was concluded with Germany, Austria, Turkey, and Bulgaria at Brest-Litovsk on Dec. 17, 1917. Here on December 22 despite Allied protests to Russia against concluding a separate peace, a formal Peace Conference was inaugurated. The idealistic peace proposals advanced by the Bolshevists were accepted by the Germans "in principle" but entirely vitiated in practice. Early in January the Conference reached an impasse owing to extreme Teutonic demands and insistent Bolshevist propagandizing. On February 10, the Soviet government announced that it could not conclude peace but would not renew the war. The Central Powers, however, terminated this solemn farce by reopening hostilities. Trotsky gave up the foreign office for the war portfolio and was succeeded by Tchitcherin, who coöperated with Lenine in bringing about a renewal of negotiations. An exceedingly drastic set of peace terms was finally incorporated in the Treaty of Brest-Litovsk, signed on Mar. 3, 1918. This convention registered a striking devolution of the age-long process of Russian European aggrandizement, for the huge and heterogeneous empire was diminished and transformed into an essentially national state of an area comparable with that existent before Peter the Great. By a curious coincidence the same period witnessed the retransfer of the national capital from Petrograd (Peter's town) to Moscow. The Bolshevists were obliged to relinquish Finland, Poland, Esthonia, Livonia, Courland, Lithuania, Ukrainia, Bessarabia, and part of Transcaucasia, which, although not annexed to the Central Powers, were dominated and economically exploited by them. Russia thereby lost 26 per cent of her population, 27 per cent of her arable land, 32 per cent of her average crops, 26 per cent of her railway system, 33 per cent of her manufacturing industries, 73 per cent of her total iron production, and 75 per cent of her coal fields.

Bolshevist Domestic Policy. In the meantime the Bolshevists were consolidating their power in Russia. Internal opposition was repressed with an iron hand. By means of revolutionary tribunals and summary proceedings they inaugurated a régime of systematic terrorism to extirpate reactionaries, hostile liberals, and lukewarm moderate revolutionaries. Among the tens of thousands who perished in the years 1918–19 were ex-Czar Nicholas II and his family, who were deliberately killed at Ekaterinburg on July 16, 1918. The methods of Bolshevism, the much-vaunted dictatorship of the proletariat, thus savored of ruthless czarism at its worst. Indeed, though the Bolshevists expected that the state, which they regarded as purely a "capitalist organ," the tool of a dominant class in society, would be rendered quite superfluous with the ultimate realization of communism, nevertheless they believed that during the transitional period of "dictatorship" the proletariat would require an instrumentality of control fully as coercive as the capitalistic state. It was not political democracy, it was force and fraud which these would-be communists utilized to establish and perpetuate their rule. The National Constituent Assembly, finally elected by equal, direct, universal, and secret suffrage in November, 1917, embraced a considerable majority of Social Revolutionaries who were anti-Bolshevist in sympathy. The Council of People's Commissars, not finding this organ of democracy sufficiently subservient, postponed its meeting till January, 1918, and finally dissolved it altogether. The All-Russian Congress of Soviets, purged of militant anti-Bolshevists, automatically became the supreme repository of legislative power.

Individual liberties, political democracy, and the prosecution of the War were all shelved while the new Bolshevist government embarked on a radical course of social and economic experimentation and revolution A series of decrees issued in November, 1917, and subsequently, pronounced the doom of the capitalistic régime All special privileges were abolished, and obligatory labor was enjoined on all citizens. Private ownership of land was abolished without compensation, and all real estate was nationalized, the peasants being permitted to occupy such land as they actually cultivated. Mines, forests, and railways were appropriated by the state, and factories were transferred to the management and operation of workingmen. The national debt was repudiated, private banking resources confiscated, and foreign trade made a government monopoly. "The Russian Orthodox Church was shorn of its wealth, deprived of state support, and reduced to the position of a voluntary, unprivileged, and self-supporting society. Private schools were suppressed, and considerable attention was given to the development of a nation-wide system of public schools which should be owned and directed by the state and in which loyalty to Bolshevist principles should be inculcated. Altogether the Bolshevist régime in Russia effected a vast holocaust of traditional forms and usages, of ancient privileges and institutions; it ended aristocracy as well as Czarist autocracy; it transformed both church and state; it substituted socialist for individualist concepts of property."

The substance of these Bolshevist principles, precepts, and practices was enshrined in the constitution of the Russian Socialist Federated Soviet Republic, adopted in July, 1918, by the fifth

All-Russian Congress of Soviets. By this document all central and local authority was formally vested in Soviets of workers', soldiers', and peasants' delegates. For Soviet elections all citizens and resident aliens over 18 years of age, male and female, who earned their living by "productive labor," and all revolutionary soldiers and sailors were enfranchised, but the right to vote was denied to all capitalistic producers, landlords, private merchants, clergymen, and certain other classes. The centre and source of all power was to be the All-Russian Congress of Soviets, consisting of representatives from the Soviets on the basis of one delegate for every 25,000 electors, and from provincial congresses of Soviets on the basis of one delegate for every 125,000 inhabitants—the franchise being thus heavily weighted in favor of the urban workers, the main supporters of Bolshevism, who were represented both in their own city soviets and in the provincial congresses and therefore enjoyed double electoral powers. The All-Russian Congress thus constituted was empowered to elect an All-Russian Central Executive Committee of some 200 and later 300 members to serve as the controlling executive, legislative, and administrative organ while the Congress itself was not in session. The Central Committee in turn was to designate a supreme central administrative cabinet, the Council of People's Commissars, composed of 18 members responsible to the Central Committee and through it to the Congress and subject to recall at any time. Individually these commissars were to preside over various departments such as those of foreign affairs, war, interior, justice, labor, etc.; and collectively they were responsible for the general conduct of affairs and the execution of Soviet policies. The commissars who exercised the real authority were thus about five steps removed from direct popular election and control, if such a thing might be said to exist in a country where the Bolshevists (Communists), a mere minority party of some 600,000 highly disciplined members, controlled the machinery of government and the organs of public opinion The drastic way in which they had fulfilled popular longings for peace, for land, and for proletarian privileges assured them a modicum of popular support; and this, taken in conjunction with their arbitrary use of force, kept them in power.

Despite perennial and perfervid prophecies to the contrary, the Boshevist government proved unexpectedly stable; it survived domestic insurrections, counterrevolutionary movements, and foreign intervention during the troubled years from 1918 to 1921; by 1924 it had attained a not inconsiderable measure of domestic support and foreign recognition. But its leaders were unable to achieve either of their two major objectives: (1) the successful and complete communization of Russian society; (2) the precipitation and consummation of a world-wide proletarian revolution.

Aside from and in addition to any inherent fallacies in Bolshevist doctrines (see BOLSHEVISM; COMMUNISM; SOCIALISM) and obvious technical limitations of Bolshevist leadership, there were many virtually insuperable obstacles to the achievement of communistic reforms in Russia. These embraced such factors as: (1) the colossal and almost universal ignorance of the lower classes, on whose intelligent and voluntary coöperation the success of such ventures largely depended; (2) the "persistent and deep-seated hostility of dispossessed property-owners in Russia and of capitalists in foreign countries"; and (3) the agricultural, industrial, and commercial demoralization of Russian society resulting from the War and already manifest when the Bolshevists seized power in November, 1917. The next four years saw confusion worse confounded.

Agrarian Situation. The widespread prevalence of agrarian unrest and the peasants' passion for land had been potent factors in the subversion of the old régime. Approximately 85 per cent of the population of Russia was classed as rural, and the problem of adjusting the theories of the revolution to meet the interests of this great class was a source of much concern to the Soviet authorities. The land expropriation and redistribution which accompanied the Bolshevist coup d'état augmented the total land holdings of the peasantry from 70 per cent of the total cultivated acreage to 96 per cent in European Russia proper and from 55 per cent to 96 per cent in the Ukraine. In this process, not only were virtually all the large landed estates wiped out, but larger peasant holdings disappeared as well, so that eventually small farms of less than 22 acres comprised 90 per cent of the total. The basic principle of the law of February, 1918, was the abolition of all private ownership of soil; all land was to be distributed on the basis of an "equalized land tenure" to individuals for cultivation. The individual holder became virtually an employee of the state; the produce, after a deduction of enough to meet his current requirements, became the property of the state. The great mass of peasants failed entirely to comprehend that this law confiscated their land as well as that of the erstwhile privileged classes. Conflicts between peasants and former urban workers and others who desired to benefit by the new policy led to a restatement of the land policy in a new law (February, 1919) which while not prohibiting individual farmers declared definitely in favor of "large Soviet estates, rural communes, group agriculture, and all other forms of collective use of land," and stated that "all forms of individual use of the land" were "merely temporary and doomed to disappearance."

In the years following the land-socialization policy there was a marked decrease in the area under cultivation. This and other circumstances, notably crop failures, forced the government to take two highly important steps in the reversal of that policy. First, in the spring of 1921, the principle that the entire produce of the farmer belonged to the state was virtually abandoned. All peasants who paid a fixed tax in kind were given the right to dispose of any surplus as they pleased In the second place, in the spring of 1921 the fundamental law of land possession was completely revised. While it reiterated the basic principle that "the land belongs to the state" and repeated the prohibition against the purchase, sale, and mortgage of land, it completely abandoned the idea that "all forms of individual use of the land should be regarded as merely temporary and doomed to disappearance." The peasants were given not the technical ownership but the actual possession of the land. The old village communities were allowed to continue their practice of permanent group possession with periodical repartition to members for actual use, but at the

same time the individual peasant family was to be permitted to break away from these communities and to acquire direct possession, perpetual and hereditary. The new law was thus almost identical in principle with Stolypin's agrarian measures of 1907 and 1910. In short, it was a distinct recognition of the individualistic tendencies of the mass of the peasants, coupled with a continued attempt to guard against any return to economic inequality in land possession. A new system of graduated land taxation helped toward the same end of maintaining social equilibrium. Agriculture constituted the one line of production in Russia where human enterprise was practically unaffected by the communist régime from the start, and where, given more freedom and opportunity to dispose of their output and to export surplus grain, the peasantry might conceivably attain greater prosperity than ever before, thus potentially raising the general level of national prosperity. By 1923 Russian agricultural production aggregated 75 per cent of the pre-war average.

Industrial Situation. Industrially, Russia in 1917 had been severely strained by the War. The breakdown of the railways and shipping of the transportation system not only interrupted trade and deprived the peasants of implements and supplies but prevented the shipping of foodstuffs to the industrial cities. Here, the expropriation of factory owners and the prohibition of trade completely dislocated the normal economic relations of society, for the workmen proved too ignorant to operate the great industries without technical assistance. "Industrial production dropped to the lowest ebb, due to the system of management by workmen's committees, lack of incentive for human endeavor, the scheme of universal state maintenance of the working classes, equalization of all working personnel, irrespective of the degree of responsibility or nature of work performed." Various measures for stimulating production by all kinds of premiums and penalties were utilized and discarded in turn. The dwindling of available reserves of materials and productive equipment to serious proportions and the menacing diminution of agricultural acreage noted above threatened the proletariat with starvation, and menacing strikes occurred in Petrograd, Moscow, and other cities during the winter of 1920–21. The Soviet government was compelled to modify the application of its communistic policies. Technical experts and managers were restored to their positions at relatively high salaries. Trading in commodities, at first prohibited, then winked at, became openly tolerated and was finally legalized in May, 1921.

The "New Economic Policy." On April 7 of the same year the original plan of complete state confiscation of all industrial products was modified to permit industrial enterprises to allocate a certain portion of their output to workmen as wages and premiums, the workmen in turn being free to dispose of these products in the open market. This was the beginning of the so-called "New Economic Policy" (N.E.P.), characterized by Lenine as a "strategic retreat," which marked the gradual abandonment of communism through the successive phases of collectivism and state socialism to a system of quasi state capitalism. Under the new system nearly all the basic industries were organized into self-governing trusts and syndicates, accountable to the state for only part of their current profits. Private initiative was admitted by leases of less essential enterprises and by concessions and participation in mixed companies, in which, however, the controlling interest was to be held by the state. The principal banks continued under government control, and foreign trade remained a government monopoly. Labor armies and compulsory labor in general were abolished, as well as all forms of rationing. The ordinary system of employment and wage-earning was restored, with the interference of trade union and factory committees in the management of works reduced to a minimum. Two contrary developments manifested themselves after the inception of the new economic policy: (1) the continued process of exhausting the means of production; and (2) the improvement in the organization of industrial processes and of exchange. By 1922 Russian industry reached 22 per cent of pre-war production, a measurable increase over previous years; in 1923 the figure had increased to 35 per cent, and in 1924 to 45 per cent.

The new departure in internal policy, coupled with the cessation of foreign war (see below), seemed to prefigure a brighter future for Russia. The disastrous effects of the famine of 1921 were dissipated in succeeding years by more favorable crops. Industry seemed to be reviving, and trade was resumed with various foreign countries. But the new order of things, frankly advocated by Lenine and the more moderate associates, was vigorously assailed by the Communists of the extreme left wing, and there was considerable dissension in party councils. The personality, intellect, and will-power of Lenine overbore all opposition, and even during his prolonged illness during 1922 and 1923 his policies prevailed. The death of Lenine on Jan. 21, 1924, was followed by a pronounced change in governmental policy. His successor, Rykov, inclined in the direction of extreme communism, and during the spring of 1924 steps were taken toward abandonment of the compromise with capitalism which had been made during 1921 and 1922 and the reintroduction of pure communism. This swing back to the extreme left occasioned no small confusion in the ranks of the Communist party. Even before Lenine's death, his lieutenant Trotsky had broken lances with the extremists and fallen under censure; and after the overshadowing figure of Lenine had passed away, factional strife became exceedingly violent. The years from 1922 to 1924 were also marked by bitter religious controversies, over religious teaching in the schools, the confiscation of church property, the attempts of the government to encourage the "Living Church" movement, and the trials and executions of various prominent prelates, both Russian Orthodox and Roman Catholic, on charges of treason. There was a marked tendency, it may be remarked in this connection, toward the abandonment of Christianity on the part of such Bolshevists as were not Jews, and toward the substitution of somewhat bizarre Communist ceremonies for the Christian ritual of baptism and death; marriage became a civil contract, readily dissolved by mutual consent, but not more than three divorces were permitted to the same person in any one year.

Foreign Policy. No less preoccupying than domestic affairs were the foreign relations of Soviet Russia. The Treaty of Brest-Litovsk,

far from ridding Russia of the Teutonic "peril," proved a prelude to systematic and sustained intervention in her internal affairs during 1918. Such Russian economic resources as were susceptible to German seizure were ruthlessly exploited to bolster up Germany's war-weakened military and economic machinery then making its supreme effort on the western front. Separatist nationalities in Finland, Esthonia, Latvia, Lithuania, Poland, and the Ukraine emancipated from Russian control by the Treaty of Brest-Litovsk were encouraged to set up anti-Bolshevist governments under German surveillance and semisuzerainty. In order to prevent too active Bolshevist propaganda in Central Europe, financial and military support was extended to Russian counterrevolutionary leaders. Only the complete collapse of the Central European coalition in October and November, 1918, saved Russia from even more far-reaching Teutonic domination.

The defection of Russia from the Allied cause had proved a staggering blow to the Entente, and the course of the Bolshevist leaders was naturally resented by the governments of France, Great Britain, Italy, Japan, and the United States. The revelation of the secret treaties, the negotiation of a separate peace, the repudiation of Russia's immense foreign indebtedness, the inauguration of a communistic régime within Russsia with its attendant nationalization of property and inevitable reign of terror, all taken in conjunction with the apprehension aroused by the openly avowed Bolshevist ambition to effect a world-wide social revolution, infuriated Allied public opinion against Russia. In March, 1918, Allied intervention in Russia began in earnest, ostensibly to revive the eastern military front and to prevent German recuperation at Russian expense, but also with the ulterior purpose of setting limits to the subversive activities of the Bolshevists and of striking anticapitalist communism in its very stronghold A rigorous economic blockade was established around the erstwhile Allied country, and expeditionary forces were landed at Murmansk in northern European Russia and at Vladivostok on the distant Pacific coast Truly the year 1918 was a period of terror and turmoil for all Russians. Even with the triumph of Allied arms in the War, intervention in Russia did not cease. "The Allies occupied northern Russia, the Crimea, and most of Siberia; members of the dissolved National Constituent Assembly, with a following of Social Revolutionaries, Constitutional Democrats and some reactionaries, set up at Omsk an anti-Bolshevist government which claimed to be the legal successor to Kerensky's provisional government; and certain reactionary Russian army officers such as Generals Denikin and Wrangel in southern Russia, or General Yudenitch, in the Baltic area, rallied Ukrainians, Cossacks, and adventurers to their standards, and with Allied support, undertook military campaigns against the Bolshevists."

In the spring of 1919 the Paris Peace Conference, profoundly disturbed by the spread of Bolshevism and its seeming menace to western society, endeavored to find some solution of the Russian imbroglio, but no settlement could be attained (see PEACE CONFERENCE AND TREATIES). Following the breakdown of these negotiations, the Allied governments reverted to the policy of supporting the various counterrevolutionary factions which in conjunction with the Allied expeditionary forces hemmed in and harassed Soviet Russia from all sides. Chaos reigned in eastern Europe throughout 1919, but in the course of time the Bolshevist government managed both to ward off foreign intervention and to suppress domestic revolts. The counterrevolutionists quarreled among themselves; the Russian proletariat and peasantry feared the triumph of reactionary royalism and the undoing of 'hard-won social and economic reforms; the spirit of nationalism impelled large numbers of non-Bolshevik Russians to coöperate in resisting foreign aggression; and finally the Allied governments had far too divergent interests and were far too exhausted by the long-continued strain of war to be able or willing to unite in a vigorous policy of coercion The Allied expeditionary forces were withdrawn from northern Russia in the autumn of 1919 and, in the spring of 1920, from Siberia, except Vladivostok, which remained temporarily under Japanese control. The various border states, Poland, Finland, Lithuania, Latvia, and Esthonia, were still encouraged to wage incessant warfare with Russia and were utilized from time to time as bases for fomenting and launching additional counterrevolutionary movements But with the withdrawal of active Allied military opposition the Bolshevist armies were enabled to deal more effectively with these lesser opponents. Yudenitch was driven out of the Baltic area; Denikin was expelled from southern Russia and forced to take refuge in Constantinople; Admiral Kolchak, temporarily victorious in extending his anti-Bolshevist dictatorship from Siberia into eastern European Russia during 1919, sustained serious reverses in battle, was captured by the Bolshevists, and was executed in February, 1920.

The French, however, continued throughout 1920 to make trouble for Russia and incited the Poles to wage aggressive war (see POLAND) with the aid of the Ukrainians, and aided and abetted the counterrevolutionist General Wrangel, Denikin's successor in southern Russia It was of no avail. On Oct. 1, 1919, Esthonia, Latvia, Lithuania, and Finland had united in proposing the negotiation of peace with Russia, and during the next year treaties were made between these states and the Bolshevist government. On Feb 2, 1920, Russia and Esthonia signed the Treaty of Dorpat providing for Esthonian independence and for reciprocal commercial advantages. By the Treaty of Moscow, July 12, 1920, the independence of Lithuania was recognized. War with Latvia was terminated by the Treaty of Riga, Aug. 1, 1920, by which Russia acknowledged the independence of Latvia and her sovereignty over Livonia, Courland, and Latgallia. Finland, long oppressed by the Czars, signed a peace at Dorpat on Oct. 24, 1920, by which her independence was confirmed, boundaries adjusted to include the district of Petchenga in the north, and portions of Eastern Karelia assigned to Russia. Russia also endeavored to come to terms with the Poles, but it was not until after a series of defeats and victories on both sides resulted in a stalemate an' the Treaty of Riga (Oct. 12, 1920, confirmed in final form, Mar. 18, 1921) that a settlement was finally achieved, stipulating Polish independence and the rectification of the eastern boundary of Poland (q.v.). Meanwhile the Bolshevists had successfully evicted General Wrangel from the Crimea and reconquered the

Ukraine (q.v.) which was once more attached to Great Russia by a treaty signed Dec. 28, 1920, consolidating the administration of economic and military affairs in such fashion as to leave the Soviet government of the Ukraine with the merest shreds of independence in foreign affairs, agriculture, education, and justice. Other border peoples, also, which had temporarily broken away, were regained by the Moscow commissars, who interpreted their dogma of self-determination in such fashion as to permit armed assistance to Red factions in neighboring states. In the Caucasian republics of Azerbaijan and Armenia (q v), Red troops helped to establish Soviet governments late in the year 1920, and in the following year Georgia (q v.) was sovietized and united with its two neighbors into a Caucasian federation under Moscow's protection. In Central Asia, Russian Turkestan was brought under firm control, and the Khanates of Khiva and Bokhara were transformed into Soviet republics despite the efforts of a brilliant Turk, Enver Pasha, to include them in a fantastic Pan-Turanian state (see PAN-TURANIANISM). Most of Siberia (q.v.), after the fall of Kolchak, was reincorporated into Soviet Russia, and the short-lived Far Eastern Republic, in the eastern extremity of Siberia, returned to the fold in 1922. The process of reintegration culminated in the signature of a treaty, Dec. 30, 1922, providing for the virtual federation of Soviet Russia, Soviet Ukraine, the Soviet republics of the Caucasus, and the White Russian Soviet Republic. On the basis of this treaty a new constitution was promulgated in 1923, establishing the "Alliance" or "Union of Socialist Soviet Republics." (See *Government*)

The liquidation of Russian imperialistic interests in the Near, Middle, and Far East was simultaneously being consummated. At the outset the Bolshevist doctrinaires had eschewed imperialism as a phase of the capitalism they sought to destroy, and true to the tenets of their creed, they had renounced the concessions and privileges acquired by prerevolutionary Russian governments in Turkey, Persia, Manchuria, and Mongolia. This anti-imperialist policy, at first manifested chiefly in negative form, soon assumed the positive aspect of a vigorous and widespread attempt to arouse the Asiatic races against Anglo-French domination and "exploitation." Afghanistan (q.v.) was incited by Bolshevist propaganda and encouraged by a Russian alliance to make war on the British Empire and to emancipate itself from British tutelage. With the Nationalist government of Turkey (q.v), the Moscow anti-imperialists likewise negotiated an alliance against European imperialism, but in this case the interests of the Allies were not sufficiently harmonious to make the treaty an effective force; the divergence of aims was seen most clearly at the Lausanne Conference (see PEACE CONFERENCE AND TREATIES), when the Turks showed themselves willing to compromise with Western Europe regarding the freedom of the Straits, while the Russians, anxious to exclude British and French warships from the Black Sea, held out for the absolute closure of the Straits to vessels of war. With China (q.v.) the Russian government after long negotiations concluded a treaty concerning railway interests in Manchuria and other disputed matters. The value of such diplomatic gestures as means of emphasizing Russia's self-appointed rôle of antagonist to European imperialism was enhanced by the propagandist activities of the Third International, supposedly a federation of Communist parties of all countries, but actually a propagandist organization, officered by leading members of the Russian government, dominated by the Russsian Communist party, and adhered to by only an insignificant minority of Socialists outside Russia. This organization directed its inflammatory agitation not only toward the subject peoples of Asia, but also toward the "capitalistic" nations of the West. The latter phase of its activity was particularly offensive to the United States government, the former to Great Britain.

The vigor shown by the Bolshevik government in suppressing counterrevolutionary movements and in reintegrating at least part of the old Russian Empire wrought a radical change in the attitude of the western powers The Allied blockade had failed to crush Russia. Post-war Europe needed commerce, and the British in particular were manifesting serious concern about the necessity of restoring normal economic life in Central and Eastern Europe to provide sources of food and raw materials and markets for British manufactured goods. They were also anxious to diminish or eliminate causes of friction with the Bolshevists so as to prevent trouble in Persia, Afghanistan, and India. These realistic considerations did not operate with equal force in the case of France, Japan, and the United States. The French, mindful of the 26,000,000,000-franc debt which the Bolshevists had repudiated, steadfastly refused to countenance any recognition of Soviet Russia. The United States firmly refused to recognize the Soviet government as representing the Russian popular will. Japan, despite four amicable secret conventions negotiated with Russia in 1906, 1910, 1912, and 1916, sought to profit by the temporary eclipse of her neighbor to enhance her interests in Siberia. On Jan. 16, 1920, the Supreme Council at Paris announced the lifting of the blockade around Russia and the prospective reëstablishment of trade relations, although Allied statesmen were at one in emphatically repudiating any desire or intention of recognizing the Bolshevist dictatorship During the remainder of 1920 the British, despite French opposition and the complications resulting from the Russo-Polish War, carried on negotiations for a trade agreement Questions of propaganda and of Soviet policy in Asia were also subjects of acrimonious correspondence. (See PERSIA; AFGHANISTAN; TURKESTAN; etc.) Finally, on Mar. 16, 1920, a trade agreement was signed, involving de facto recognition of Russia, the removal of all hindrances to a resumption of economic relations, the mutual abandonment of propaganda against the institutions of the respective signatories, etc. On this agreement as a prototype were modeled numerous agreements with other countries from 1921 to 1924. Germany signed an agreement on May 6, 1921; Norway, Sept 2, 1921; Austria, Dec. 7, 1921; Sweden, Mar. 9, 1922 (failed of ratification); Italy, May 29, 1922 (also failed of ratification); Czecho-Slovakia, June 5, 1922; and Denmark, Apr. 24, 1923.

The problem of Russia proved the storm centre at the important Genoa Conference (Apr. 10–May 14, 1922). Russia desired complete recognition and an Allied loan, but the French continued to insist that Russia should respect the rights of private property and recognize her

past debts. The sole tangible result of the conference was the signing of the Russo-German Treaty of Rapallo, providing for mutual cancellation of debts and war claims, which still further infuriated the French. The year following Genoa saw little headway made in the reacceptance of Russia into the family of nations, but late in 1923 and early in 1924 its prospects visibly brightened. De jure recognition was gained from Poland in December, 1923; from the Labor government of Macdonald in Great Britain, Feb 1, 1924; from Austria, Norway, and Italy in February; and from Sweden and Greece in March. Other countries seemed ready to follow their example. The Jugo-Slav minister of foreign affairs announced in July that he favored recognition of Russia but could not tolerate Communist propaganda. Rumania was "theoretically" ready to grant recognition but could hardly do so in practice as long as Russia refused to acquiesce in the Rumanian annexation of Bessarabia (q v.). Even France, hitherto the most irreconcilable antagonist of Soviet Russia, announced in June, 1924, through the Radical Socialist premier, Edouard Herriot, a readiness to negotiate regarding terms of recognition but did not follow the announcement with overtures to Moscow, possibly because of the recrudescence of extreme Communism in Russia Japanese negotiations with Karakhan, the Soviet envoy, were complicated by Russia's demand for the return of northern Sakhalin (q v) and Japan's insistence on prior claims to the oil resources of the region. Very significant as an indication of possible future relationships between Russia and the western powers were the agreements signed at London on Aug. 8, 1924, after somewhat acrimonious discussions between Soviet representatives and the Macdonald government: while maintaining in principle its decree of January, 1918, repudiating foreign debts, the Russian government recognized the claims of British bondholders to such limited satisfaction as circumstances permitted, and agreed also to a plan for the compensation of British nationals whose property had been confiscated by Communist decrees See the articles on FINLAND; ESTHONIA, LATVIA; POLAND; ARMENIA; AZERBAIJAN; GEORGIA; BOKHARA; TURKESTAN, RUSSIAN; KHIVA; SIBERIA AND FAR EASTERN REPUBLIC; CHINA; JAPAN; WRANGELL ISLAND; NAVIES OF THE WORLD; WAR, DIPLOMACY OF THE.

RUSSIAN LITERATURE. Russian literature was in an unfortunate condition at the beginning of the War. The neoromantic school was declining and the new tendencies were not yet clear. The War had little effect upon literature. Many of the authors, as Sologub and Chirikov, wrote on the War, but Andréev alone, with his play translated as *The Sorrows of Belgium*, rose above mediocrity Many of the books written during these years, as Sergyeyev-Tsensky's *The Oblique Helena*, did not even touch the War and all too many of the authors sympathized with the defeatists.

With the outbreak of the revolution in 1917 and the assumption of power by the Bolsheviks, a sharp break came in Russian literature Most of the better-known authors, especially those who carried on the tradition of Chekhov, fled abroad, like Kuprin. They continued publishing, but very little of this *émigré* literature could hope to survive. The greatest of these works is the *Road to Calvary* by Count Alexis N. Tolstoy. This is intended to be the first part of a trilogy and gives vivid pictures of the confusion in Petrograd during the War. The history of the period is resumed in Ataman Krasnov's *From the Two-Headed Eagle to the Bolsheviks*, a typical "White" novel which sets forth in glaring colors the sins and crimes of the Bolsheviks. We may mention here also Merezhkovsky who preaches that the Bolsheviks are Antichrist (*The Kingdom of Antichrist*), and Andréev who died in Helsingfors after writing *S.O.S.*, a brilliant journalistic attack on the Allied leaders for seeking terms of peace with the Bolsheviks Others of his works, as *He Who Gets Slapped*, do not touch the War and this is true of much of this *émigré* literature. The authors look back with longing and approval on the old world which came to such a rude and sudden ending.

Within Russia, conditions became steadily worse and the excesses of the communistic leaders toward the educated classes of the community drove author after author abroad or so weakened others that they fell an easy prey to disease. Thus Alexander Blok died in 1920 but to him we owe the greatest poems of the War. "The Twelve" describes the progress of a revolutionary patrol through the streets of Petrograd on a stormy night and as they pass along they are led invisibly by Christ who marches ahead without regard to the firing and the shots. The meter and the treatment sum up all of Blok's earlier work and the poem remains as the best representation of the spirit of the revolution. "The Scythians" is a challenge to western Europe and boasts of the great gulf that separates Russia from Europe and makes her a real intermediary between Europe and the Mongols.

With the exception of these works, little of value was produced. The same tendencies which had reigned before continued. There was the search for God of the followers of the philosopher Solovyev, often expressed in forms that seem little short of blasphemous, as Byely's "*Christ Is Arisen.*" The extension of the Third International into Asia and the tendencies of the Scythians are reflected in poems by Marienhof and Oryeshin, who boast of the new day when Asia can be matched with a weakened and decaying Europe. There is, of course, an infinite amount of verse, mostly of inferior quality, glorifying the Bolshevik régime and shouting out defiance to capitalism In the beginning the futurists were favored by the government and Vladimir Mayakovsky, with his masque on the conquest of heaven by the communists, became almost the official poet of the government, but he lost his influence and the growing stabilization of conditions moderated the tone of the more violent writers Among the writers of real merit, Anna Akhmatova probably ranks first. A quiet singer of love, she is drowned in the storms of lesser authors who compose the fifteen-odd schools of poets who contend in the name of art for supremacy. Others of note are Yesenin, the peasant husband of Isadora Duncan; Vyacheslav Ivanov, who continues his cult of the dying god undisturbed by the storms and tumults of the age; Pasternak, Erenburg and Marya Tsevtayeva.

The period was not so propitious for prose. Gorky was drawn into the service of the Soviet government and strove to help and support those intellectuals who remained in Russia.

Valery Bryusov, more classical than ever, devoted himself to a scientific study of Pushkin and Russian verse. Much attention was given to the discovery of hitherto unpublished works of older authors. Several fragments of Dostoyevsky were discovered but they do not seem to have added as much as had been expected to our knowledge of his works.

Poetry had the preëminence over prose, although during the last years a new school of prose writers developed, largely under the influence of Zamyatin. Among his followers we may mention the group known as the Serapion brothers, the chief of which is Nikolay Nikitin, and Zoshchenko. The stories are vivid and brutal and they lack the excessive stress on psychology which is characteristic of the pre-war literature. Other prose authors are Lebedinsky (*The Week*), and Pilnyak (*The Hungry Year*).

No summary of the literary world of Russia would be complete without mention of the Russian theatre. Despite almost insuperable obstacles the Moscow Art Theatre (see THEATRE) was held together and even greater progress was made in the developing of its art. Nevertheless, the actual production of plays fell behind the art of staging and the greater amount of attention was given to novel and effective renderings of many of the great plays of all ages and of all languages. In the winter season of 1922–23, a large part of the company under Stanislavsky made an extended tour through Europe and America. This extension of the Russian dramatic art and technic throughout the world was undoubtedly one of the great results of the revolution.

Russian literature showed a vitality which allowed it to survive conditions which overwhelmed all other parts of the national life. Not only did the fears of those who thought that it was doomed to perish prove needless but at the close of this period the literature, changed and transfigured, was very clearly starting again on a new era.

RUSSIAN SOCIALIST FEDERATED SOVIET REPUBLIC. See RUSSIA.

RUSSO-POLISH WAR. See VILNA.

RUST OF WHEAT. See PLANTS, DISEASES OF.

RUTGERS COLLEGE. A nonsectarian institution at New Brunswick, N. J., founded in 1766. The student enrollment in 1914 was 440 undergraduates in the fall term and 450 in the summer session, as compared with enrollment in 1923–24 of 743 undergraduates and 830 in the summer session of 1923. The trustees in 1918 established the New Jersey College for Women as an affiliated institution, not coeducational; in 1923–24, it had 419 undergraduates. The faculty of Rutgers College increased from 55 to 115 members and the library from 76,643 to 123,000 volumes. In 1916, the college celebrated the one hundred and fiftieth anniversary of its foundation in 1766 as Queen's College by charter from George III. Additional endowment was secured and in 1919–20 a million dollar campaign was carried to completion. The John Howard Ford Dormitory was built and furnished in 1914. A ceramics building and several buildings for the agricultural college were erected. The State College for the Benefit of Agriculture and the Mechanic Arts, maintained by the trustees of Rutgers College, was designated by the Legislature the State University of New Jersey in 1917. President, William H. S. Demarest, D.D., LL.D.

RUTH, GEORGE HERMAN (1894–). Professional baseball player, known to all fandom as the "Babe," born at Baltimore, Md. He joined the Baltimore International League Club in 1914 and was sold to the Boston Club of the American League in 1915. He was bought by the New York American League Club in 1920 for $150,000, the largest sum ever paid for a ball player. As a member of the "Yankees" he established a world's record by knocking out fifty-nine home runs during the season of 1921 and for his all-around work in 1923 was voted the most valuable player in the American League.

RUTHENIA. See CZECHO-SLOVAKIA; GALICIA, EAST.

RUTHENIANS. See BUKOVINA; GALICIA; UKRAINE.

RUTHVEN, ALEXANDER GRANT (1882–). An American zoölogist, born at Hull, Iowa, and educated at Morningside College and the University of Michigan. He was instructor in zoology and curator of the museum (1906–12), and professor of zoölogy and director of the museum (1912–) at Michigan. His publications were on the reptilia, and he collaborated with Schull and La Rue in *Principles of Animal Biology* (1920).

RYAN, HARRIS JOSEPH (1866–). An American electrical engineer, born at Powell's Valley, Pa., and educated at Cornell University. He became an instructor in physics at that university in 1888 and a year later was made professor of electrical engineering; this chair he held until 1905, when he accepted a call to a similar professorship at Stanford University. During the War he was director of the anti-submarine laboratory of the National Research Council at Pasadena, Cal. He gave much attention to methods for electrical engineering tests and measurement; the laws governing relation of size and separation of conduction; and electric pressure at which corona and power waste appear in high-pressure power transmission lines. Professor Ryan was a member of the Jury of Awards at the World's Fair held in Chicago in 1893 and at that held in San Francisco in 1915. In addition to many papers and monographs on electrical subjects variously contributed, he wrote *Textbook of Electrical Machinery* in collaboration with H. H. Norris and G. L. Hoxie.

RYAN, JOHN DENIS (1864–). An American capitalist, born in Michigan. He was a director and official in many important copper mining companies and in 1918 was appointed director of aircraft production by President Wilson. In the same year he served as second assistant Secretary of War and director of the Air Service. He was also a member of the War Council of the American Red Cross.

RYKOV, ALEXIS IVANOVITCH (1881–). A Russian statesman, born at Saratov, and educated at the University of Kazan, where he studied engineering. He was many times jailed for political reasons. In 1903, while studying his specialty, economics, at Geneva, he met Lenine, and from that time the two were close friends. Rykov led the revolt of 1905 so successfully that he was elected to the Central Committee of the Social Democratic Labor party. In the first Bolshevik cabinet he was People's Commissar for the Interior; later he was head of the Supreme Council of National Economy.

He was first vice president of the Council of People's Commissars of Russia and was virtually premier during the illness of Lenine, on whose death he became Premier of Soviet Russia. Among his first acts as premier was the order of an issue of silver coins to provide small change for the peasants and the formulation of plans for a better working relationship between the farmers and the industrial workers. He wrote much in the field of economics.

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SAAR BASIN. A region created by the Peace Conference, contiguous to the northeast boundary of France. Area, 1920 square kilometers; population in 1910, 649,509, in 1919, 589,773, of whom 110,623 were in the town of Saarbrücken. The inhabitants before 1919 were entirely German, except for some 3000 French. The basin, a continuation of the great Lorraine coal field, was drawn to coincide with the mines and their dependent industries, as well as with the limits of the coal deposit In 1912-13, coal produced amounted to 17,473,000 tons (6 per cent of the total German output, though 40 per cent as great as the total French); steel produced, 2,080,000 tons Glass and pottery works came next in importance. There were 72,700 miners employed, and some 50,000 other industrial workers. In 1920, 9,198,714 tons of coal were produced, and in 1922, 10,943,311 tons; to the latter figure should be added the 296,692 tons produced at the privately owned Frankenholz mine.

The final disposition of the Basin hinged on the successful culmination of the struggle between the principles of annexation and reparation. On the score of historical and ethnographical rights, French claims for outright annexation were of course lamentably weak, while strategically there could be no reason for the cession in the light of the forced demilitarization of the left bank of the Rhine. But as compensation for the willful destruction of French coal mines at Lens and Valenciennes, there was every ground for serious consideration of the French position. The final solution, as embodied in Articles 45–50 of the Treaty, was to turn over to the French in absolute ownership all the coal deposits of the territory, the value of the mines to be credited to the German reparation account; give the French the right to improve the existing systems of communication, or to create new ones, and to employ French currency; and incorporate the area in the French customs régime To avoid the indignation which would have been evoked by outright French annexation of the territory, the Peace Conference made the Saar Basin a separate state, to be administered by an international governing commission of five members, representing the League of Nations. These were to be named by the League Council for one year. The commission was to have full sovereign rights including those of levying taxes and dues. Before modifications of the law or new taxes, except customs, could be effected, the commission had to consult elected representatives of the population. This was, however, to be a temporary expedient. For the ultimate determination of the Basin's status, a plebiscite in 15 years (1935) was provided for by the Treaty. Then, every person over 20 years who had been a resident in 1919 was to have the right to vote for one of three possibilities: the international status in force at the time, union with France, or union with Germany. In the event of the reestablishment of German sovereignty, the mines were to be repurchased by Germany. On Jan. 10, 1920, the League of Nations took control, after a period of military occupation; eight days later, the French took over the mines One of the first acts of the commission was the extension of the free customs union between the Saar and Germany for five years. In June, 1922, elections took place for members of a consultative council which the commission established to aid in the work of administration. Of the 30 members, 16 were Catholic Centre, 5 Right Socialist, and 4 Liberal The maintenance of French troops in the Basin and the drastic curtailment of liberty of the press by French courts-martial provoked bitter resentment among irreconcilable elements of the population and evoked protests from liberal leaders in England and the United States, but on the whole the governing commission was far more successful in averting violent popular resistance than might have been anticipated, in view of the nationalist sentiments of the German population.

SABATINI, RAFAEL (1875–). An Italian author and dramatist, born at Jesi, and educated in Switzerland and Portugal He wrote many exciting highly colored romances dealing with various critical periods of history. Several of his books, notably *Scaramouche* and *The Sea Hawk*, were made into highly successful motion-picture plays. His writings include: *The Lion's Skin* (1911); *The Life of Cesare Borgia*, a history (1912); *The Justice of the Duke* (1912); *Torquemada and the Spanish Inquisition*, a history (1913); *The Gates of Doom* (1914); *The Sea Hawk* (1915); *The Snare* (1917); *Scaramouche* (1921); *Captain Blood* (1922); *Fortune's Fool* (1923); *Bardelys the Magnificent*, with Hamilton; *The Fugitives; The Rattlesnake* with J. E. Harold Terry; and *Mistress Wilding* (1924).

SABOTAGE. Legislative action against sabotage made its appearance in the United States in 1917 and reached its crest in 1919. By that time no less than 16 States, Alaska, and Hawaii had enacted such laws. The States were Arizona, California, Idaho, Iowa, Kentucky, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, Oklahoma, Oregon, South Dakota, Utah, and Washington. Most of the laws were aimed at "criminal syndicalism," which was defined to include advocacy of sabotage. Several laws were more specific. Thus Arizona defined sabotage as willful and malicious injury to property, or violation of the constitutional or statutory rights of another, as a means of accomplishing industrial or political ends. Nebraska's definition covered railroad property, highway bridges,

manufacturing plants or equipment, or any farm or manufactured product. Sabotage was defined by North Dakota as setting grain or food products on fire or poisoning any work or food producing animal with an intent to hinder or lessen the food supply. Montana defined sabotage as malicious, felonious, intentional, or unlawful damage, injury, or destruction of property; and Washington made it a felony to injure or derange property in order to obstruct any industrial enterprise, to interfere with the management, or to advocate such tactics. The movement against "criminal syndicalism" and sabotage, apparently a product of war psychology, stopped with the legislative grist of 1919. Only one State, Kentucky, acted since; and then, in 1922, only to make her law less severe.

SAINT CATHERINE, COLLEGE OF. A Roman Catholic college for women at St. Paul, Minn., founded in 1911. The board of trustees was organized in 1917. The number of students enrolled increased from 61 in 1914 to 413 in 1924, the members of the faculty from 11 to 35, and the library from 6000 to 17,000 volumes. The total yearly income rose during the same period from $40,000 to $352,720, and the endowment from nothing to $376,000. President, Sister Antonia.

SAINT ELIZABETH, COLLEGE OF. A Roman Catholic college for women, conducted by the Sisters of Charity, founded at Convent Station, N J., in 1899. The student enrollment increased from 91 in 1913–14 to 248 in 1923–24; the faculty rose from 22 to 35 members, and the library from 9000 to 14,000 volumes. The annual income increased from $30,700 to approximately $128,000. There was no endowment, but the sisters gave their services without remuneration. The curriculum was considerably enlarged, with additional courses in the departments of English, history, music, home economics, and sociology, and a course in leadership of girl scouts. Sister Mary Pauline Kelligar, LL.D., was president until her death in 1923. Dean, Sister Mary Jose Byrne, Ph.D.

SAINT GERMAIN, TREATY OF. See AUSTRIA; PEACE CONFERENCE AND TREATIES.

SAINT JEAN DE MAURIENNE, AGREEMENT OF. See PEACE CONFERENCE AND TREATIES; WAR, DIPLOMACY OF THE.

SAINT LOUIS. The chief city of Missouri and the sixth in population in the United States, with an area of 61.37 square miles. The population, which was 687,029 in 1910, increased to 772,897 in 1920, and by estimate of the Bureau of Census (July 1, 1924) to 812,698. In February, 1923, the city, by a vote of the people, authorized an issue of bonds for the amount of $87,372,500 for a large number of public improvements. Of the total amount of bonds voted for, $12,000,000 was for a new waterworks plant, 15 miles west from the city limits, on the Missouri River. A reservoir, with a capacity of 200,000,000 gallons, was to be constructed at the highest point in St. Louis County. Another great project, the largest under the bond issue proper, was the construction of the River des Peres sewer and channel, for which $11,000,000 in bonds was voted. The drainage works were to consist of closed sewers from the city limits west of Delmar station through Washington Heights and Forest Park to Manchester Avenue; these sewers were to carry both sewage and floods. It was said that these sewers would constitute the largest completely closed drainage system on record. St. Louis has many beautiful parks. One, Forest Park, composed of over 1300 acres, is famous for its natural and artificial beauties. The Zoölogical Garden was started under an ordinance passed in December, 1913. It has been supported, like the Art Museum and the Public Library, by the revenue of a mill tax. It was governed by a board of trustees from August, 1917. It is considered one of the finest in America. The Missouri Botanical Garden, popularly called Shaw's Garden, is widely known. It contains 135 acres. With the exception of that connected with Harvard University, it is said to be, in specimens, library, growing plants and trees, the finest in the world. The zoning ordinance of 1918, under which many plans were made and much work done during a period of six years by the City Plan Commission, was declared invalid by the Missouri Supreme Court in decisions made public in October and November, 1923. The Court held that under the charter no such police power was given to the city and that zoning could be undertaken only through eminent domain. Work on the Major Street Plan as adopted by the Commission in 1916 progressed, and much of the minor work had been completed by 1924. There are four bridges over the Mississippi River, one of which was the Municipal Free Bridge, the largest double-deck steel-span bridge in the world. The weight of the western approach is 7,938,446 tons; channel spans, 13,925,660 tons; eastern approaches, 23,919,786 tons. Total length of the railway deck is 3.459 miles; of the highway, 1.853 miles. The cost of the bridge was $6,288,435. It was built under the supervision of the Department of the President of the Board of Public Service The public schools were known for their excellence. There were 123 grade schools, six public high schools, a junior high school, a trade school, and a teachers' College. Teachers numbered 2554, and nearly 100,000 pupils were enrolled in 1924. There are also many private schools and academies and the Washington and St. Louis Universities. There are 26 lines of railroads entering the city. Factories total more than 3300, with an invested capital over $600,000,000. For the years 1914–24, the tax rate for all purposes on each $100 of assessed valuation varied from $2.22 in 1914 to $2.55 in 1921. See RAPID TRANSIT.

SAINT LOUIS SYMPHONY ORCHESTRA. See MUSIC, *Orchestras.*

SAINT MARY'S FALLS CANAL. See SAULT SAINTE MARIE, CANALS AT.

SAINT MIHIEL. See WAR IN EUROPE, *Western Front.*

SAINT PAUL. The capital of Minnesota. The population increased from 214,744 in 1910 to 234,698 in 1920, and to 241,891, by estimate of the Bureau of the Census, for 1923. St. Paul regained her old position as the head of navigation on the Mississippi River, with water connections to St. Louis and New Orleans. A municipal dock was equipped with the most modern facilities, and the Federal government built a number of modern steel barges and towboats. A school bond of $3,000,000 was voted in 1917, and in 1919 the $6 per capita limit for school taxation was removed. The James J. Hill Reference Library and Public Library was built during the period. In 1917, after a housing survey had been made, a city planning ordi-

nance was passed providing for a city planning commission of 25 citizens appointed by the mayor. This commission recommended improvements designed to give better routing of traffic across and around the city in order to relieve the congestion in the business districts. The next year a zoning ordinance was adopted providing for six use districts, including three residence, one commercial, one light industrial, and one heavy industrial, and four height districts limiting the buildings to heights varying from 40 to 150 feet Two new reinforced concrete bridges were begun in 1924 which were expected to cost more than $3,000,000. Bank clearings increased from $576,156,228 in 1910 to $1,593,-657,574 in 1922; the number of factories increased from 737 in 1914, capitalized at $101,-789.920, employing 31,430 and making products valued at $103,683,000, to 849 in 1919, capitalized at $155,685,000, employing 41,256 and making products worth $215,000,000.

SAINT PIERRE AND MIQUELON. The principal islands of two groups off the south coast of Newfoundland, belonging to France. Total area, 93 square miles; population (1921), 3918, which was increased to 12,000 during the fishing season. The only activity was cod fishing. Great gains were made in cod fishing during and after the War, as the trade records reveal. Imports for 1913, 1920, and 1921, were 4,536,745 francs, 40,846,742, and 22,989,000. Exports for the same years were 6,201,798 francs, 28,047,100, and 19,691,000. Almost all the exports went to France, while only a small proportion of the imports, 2 per cent in 1919, came from the mother country.

SAINT QUENTIN. See WAR IN EUROPE, *Western Front*.

SAINT THERESA, COLLEGE OF. An institution for women, founded by the Sisters of St. Francis at Winona, Minn., in 1910. The student body in 1923–24 numbered 420. Between the time of its foundation and 1924 the college acquired buildings of an estimated value of $2,000,000, and a productive endowment of $500,000. A chapel and a faculty house were in process of construction in 1924. In 1920 the Saint Clare School of Education was organized in connection with the college to train teachers for the parochial schools, the first fully organized and accredited school of its kind in the country. It offered a two-year course to high school graduates. President, Mother M. Leo Tracey.

SAJOUS, CHARLES E. DE M. (1852–). An American physician (see VOL. XX). In 1921 Dr. Sajous was appointed professor of endocrinology in the University of Pennsylvania. In 1922, his well-known work *The Internal Secretions and the Principles of Medicine* passed through its tenth edition and in the same year his *Analytic Cyclopædia of Practical Medicine* appeared for the ninth time. Dr. Sajous resigned as editor of the *New York Medical Journal* in 1919, after having served in this capacity since 1911.

SAKHALIN. An island off the east coast of Siberia. The region to the north of the parallel of 50 degrees was Russian territory and part of the Sakhalin Province. It has an area of 14,668 square miles and a population of 34,000 (1915). Eighty per cent of the region was covered with forest, and lumbering was the chief occupation. Japanese Sakhalin, or Karafuto, had an area of 13,148 square miles and a population of 105,765 in 1920, as compared with 39,846 in 1913 Under the Japanese the exploitation of their territory was rapidly pushed. The herring fisheries had the greatest economic value, while the presence of great forests indicated that lumbering and papermaking would soon become important. Pulp mills were already established in 1924. An enlightened government interest encouraged agriculture, and settlers were provided with land, domestic animals, and seed. Three coal basins yielded 154,193 tons in 1920. By 1917 exports had already reached a value of 17,293,000 yen and imports 11,723,000 yen. The budget for 1921–22 balanced at 14,045,806 yen; the subsidy from the Japanese Treasury was about 750,000 yen. In 1920, Japanese forces occupied the Russian portion as a result of the so-called massacre of Nikolayevsk, the capital of Sakhalin Province on the Amur River, when all the Japanese residents, numbering about 350, were slain. Responsibility was difficult to establish, and against the protests of the Russians, the Japanese troops stayed on (1924). At a Russo-Japanese conference held on Sept. 4, 1922, Japan demanded reparations as the price of withdrawal. In August, 1924, after long discussions between the Russians and the Japanese, a basis for an agreement was announced. The terms of this Russo-Japanese convention were said to include: Japanese evacuation of Sakhalin; the grant of a 55 year concession to Japanese capitalists in the oil fields of North Sakhalin; Soviet recognition of the fishery rights conferred by the Treaty of Portsmouth (1905). That the British government would oppose this agreement was inevitable, for it was pointed out that the Britsh Shell group held a previous concession to the oil fields in question. See JAPAN; RUSSIA; SIBERIA AND FAR EASTERN REPUBLIC.

SALANDRA, ANTONIO (1853–). An Italian statesman (see VOL. XX). At the outbreak of the War, he opposed Italy's joining her forces with Germany and Austria on the ground that theirs was an aggressive war. The majority of the Italians supported him, and when opposition caused him to resign in May, 1915, feeling on behalf of Salandra and the Allies rose to such a height that it actually threatened the throne. "War or a republic" was the cry. The King refused to accept Salandra's resignation, and in 10 days Italy entered the War on the side opposed to her ancient enemy and oppressor, Austria. Salandra's premiership lasted till June, 1916.

SALONIKI. See WAR IN EUROPE, *Balkan Front*.

SALT LAKE CITY. The capital of Utah. The population increased 27 per cent, from 92,-777 in 1910 to 118,110 in 1920, and to 126,241, by estimate of the Bureau of the Census, for 1923. The water supply of the city was nearly doubled in 1915 and 1916 by two dams in Big Cottonwood Canyon, impounding 550,000,000 gallons of water. Smoke regulating ordinances and a use zoning law were adopted, and a municipal bathhouse was built. Bishop Charles W. Nibley in 1922 presented a 56-acre golf course to the city. Bank clearings fell from $825,360,-260 in 1919 to $661,686,278 in 1921 and rose again to $785,320,679 in 1923; building permits increased 72 per cent, from 1115 valued at $4,-060,496 in 1919 to 1344 valued at $6,976,494; the value of manufactured products rose from $35,000,000 in 1914 to $103,814,000 (estimated)

in 1923; and the production of coal rose from 3,088,356 tons in 1912 to 4,627,570 in 1923, an increase of 59 per cent.

SALVADOR. The smallest of the Central American republics, with an area (officially estimated) of 13,176 square miles and a population (census of 1923) of 1,360,382. The official estimate for 1913 was 1,225,835 A slight increase was evident during the period in school enrollments, the figure for 1913 being 50,550, and for 1921, 57,555. But from 1919 on, the government applied itself seriously to eradicating illiteracy; 70 per cent of the population was reported as unable to read or write. Populations of the large cities were: San Salvador, the capital, 80,900; Santa Ana, 70,000; San Miguel, 33,900; San Vicente, 30,080; Nueva San Salvador, 25,960. On June 7, 1917, an earthquake and volcanic eruption did much damage to the capital and partially destroyed several smaller towns. An earthquake of great intensity shook the city of San Salvador on Apr. 28, 1919.

Industry. Coffee culture remained the leading activity, and an average of 65,000,000 pounds was exported annually. The 1923 production was 60,000 metric tons, valued at $16,800,000. Sugar made considerable advances, with a 1923 production of 20,000 tons. Cacao, rubber, tobacco, and wheat for local consumption were given increasing attention. After 1914 gold and silver mining showed possibilities, especially in the departments of Morazán, San Miguel, and La Union. The foreign trade from 1913 on increased regularly· exports in 1913, $9,011,112; in 1920, $17,943,827; in 1922, $16,213,805. Coffee averaged 80 per cent of the export value. Other exports were· sugar, henequen, gold and silver coin, balsam, hemp, hides, and rubber. The United States took 70 per cent of the coffee; Great Britain, 4 per cent. Imports in 1913 were valued at $6,174,000. In 1922, they were $7,426,760 but in 1919 they had reached the high figure of $14,958,196. Leading imports were cottons, hardware, flour, drugs, and chemicals. Trade with the United States in 1913 was: imports, $2,491,000; exports, $2,824,000. Imports in 1922 were $4,878,137; exports (1921), $3,296,622. Trade with the United Kingdom in 1913 was: imports, $1,604,000; exports, $706,000. In 1921 it was· imports, $222,356; exports, $1,263,561. In the period 1914–24 Salvador began to develop industrially and besides supplying many articles for domestic consumption exported manufactured products to neighboring countries. Local mills embraced the manufacture of cotton and silk fabrics, leather goods, fibre goods, cigars, cigarettes, sugar, etc. Electrical power was being used. Stock raising was also gaining in importance.

Finance. For 1914–15 the revenues were $6,286,470 and the expenditures $6,263,878. For 1922 they were $5,771,332 and $6,120,473. The national debt in 1913 was $10,995,854. On Dec. 31, 1921, it was $16,834,105. A $6,000,000 loan was negotiated in the United States in 1923. The three banks of issue on Dec. 31, 1921, had notes in circulation to the value of $3,508,910. The colon in 1919 was fixed at $0.50 and by the law of July 16, was made the monetary unit.

Communications. In 1922, 253, miles of railway were open, all of narrow gauge. The International Railways line from east to west was completed in 1922 when the third section was opened from San Vicente to Cojutepeque. The railway starts at La Union. In 1921 there were 2374 miles of telegraph wire and 1366 miles of telephone line.

History. Salvador was the first country to move toward effecting a better understanding among Central American states. On June 24, 1920, it sent out an invitation for a general meeting, and conferences were begun at Antigua in Guatemala on Nov. 1, 1920. On Jan. 21, 1921, a pact was signed by Salvador, Honduras, and Guatemala for a Central American Union (q.v.), thus crowning with temporary success the aspirations of a century. Salvador was the only Central American country not to declare war on Germany. In 1913 Salvador signed an arbitration treaty with the United States and a commercial treaty in 1919. Considerable local ill-feeling was generated toward the United States because it was felt that the Bryan-Chamorro treaty of 1916, in giving the United States a naval base on Fonseca Bay, violated Salvador's sovereignty. Suit was made before the American Court of Justice, and although the complaint was successful, both Nicaragua and the United States disregarded Salvador's contention. Peace was general in the country after 1914 as a result of the insistence of the United States. President for 1919–23, Jorge Meléndez; for 1923–27, the vice president, Alfonso Quinónez Molina, was raised to the presidency. Late in 1923 much interest was aroused in the United States over the terms of a $6,000,000 loan floated in New York City. The contract, which was to a large extent the work of ex-Secretary of State Lansing, provided in effect for the underwriting of the loan by the United States government. A special stipulation called for the submission of differences or interpretatons arising out of the loan's terms to the United States Supreme Court Chief Justice.

SALVARSAN. See SYPHILIS.

SALVATION ARMY. A religious organization aiming to evangelize the masses who are outside the influence of the churches, founded by the late Gen. William Booth in London in 1865, and incorporated in New York State in 1899. In the years between 1914 and 1923 the number of corps and outposts increased from 852 to 1325, the number of indoor meetings from 197,099 to 442,485, and the open-air meetings from 150,055 to 201,042. The number of officers and cadets rose from 3225 in 1916 to 4090 in 1923–24, and the number of converts from 53,483 to 100,159. Various sorts of rescue work were carried on. Over 100 industrial homes were maintained, and about 85 hotels for men and women, slum posts, and 13 nurseries, 31 maternity and rescue homes, 8 children's homes, and 10 hospitals and dispensaries. The army also conducted extensive work among prisoners; in 1923, through their efforts, 604 prisoners were paroled to the organization. Other familiar lines of their work included Christmas and Thanksgiving dinners given to the poor, summer outings to mothers and children, employment fund for men and women, and distribution of ice and coal.

During the War the Salvation Army was active in the belligerent areas and the army camps. Great quantities of clothing were collected for refugees and much relief work accomplished. By the close of the War the Salvation Army had sent 246 officers and employees to France and

100 to army camps and was maintaining 50 huts ments in France and 20 in this country, 24 ambulances for government service, 50 rest rooms for men in the service, and 20 hospitals, of which one was in France.

SALZBURG. A province of the Republic of Austria. Its area in 1910 and 1923 was 2761.9 square miles. Its population in 1910 was 214,737; in 1923, 222,731. See AUSTRIAN REPUBLIC.

SAMOA. See PACIFIC OCEAN ISLANDS.

SAMOA, AMERICAN. American Samoa comprises the island of Tutuila and several other small islands in the Pacific Ocean. The population in 1920 was 8058, compared with 7251 in 1912 and 7376 in 1916. The people are almost entirely Samoans. In 1920, these included 3166 males and 3019 females.

Products. The soil of American Samoa is rich and well-adapted to the growing of fruits, which include the orange, lemon, lime, citron, mango, alligator pear, pineapple, banana and other native fruits. The vegetables grown include the bread fruit, taro and yam. Sugar cane is grown to some extent, especially for the leaves which are used for thatch on the native houses. Coffee also has been grown in small quantities with success and tobacco is grown by the natives for native consumption The most important product of the soil, however, is the coconut, which is used as food for the natives, while the water of the green nuts is used for drink. Copra, the dried kernel of the ripe coconut, forms the chief article of commerce, and is the only export from American Samoa. It is shipped to foreign countries where oil is expressed from it. This oil is in great demand in the manufacture of coconut butters of various kinds, soaps oil for salads, and for other purposes. During the decade 1913–23, and, indeed, since the American occupation, the government has encouraged the natives to plant more coconuts and to use better methods of drying the copra. The copra sold in 1914 was 2,551,027 pounds valued at 122,965; in 1918, 3,067,177 pounds, valued at $187,481, and in 1920, 2,208,803 pounds valued at $154,616.

Industries. There are practically no industries in the islands. Copra is dried by spreading it in the sun Native women manufacture floor mats and sleeping mats from the leaves of the pandanu, but these are not often for sale. War clubs, fans, baskets, hats and necklaces of shells and beads are made to sell to tourists.

Education. The foundation of the school system of American Samoa is the parish school conducted by the native pastors of the various denominations. There is no government supervision except that by law all children between the ages of six and 13 are required to attend school regularly. Schools are maintained by Roman Catholics, Wesleyans, Mormons, and by the London Missionary Society. Since 1904, the Marist brothers have conducted a special district school at Leone. Prior to 1921 there was but one school which could actually be called a government or public school In January of that year Governor Evans instituted plans for a widespread development and expansion of the public school system throughout Samoa. A Board of Education was appointed and as a result Tutuila was divided into 13 school districts and the Manua district into two, for the purpose of establishing a graded school in each of these districts. In 1923 three such graded schools had already been established. The average attendance in the various schools is about 3000.

Trade. As noted above, copra is the only export. Imports are increasing from year to year and mount up to about $250,000 annually. About half these are from the United States.

Finance. American Samoa has no public debt. The bank is conducted under the supervision of many officials. The customs revenues are used for the upkeep of roads, schools and general island government expenses. The navy tax fund is chiefly used for the pay of native officials.

Transportation. A monthly schedule is maintained between San Francisco, Honolulu, Pagopago and Sydney, by the Oceanic Steamship Company. Over 50 miles of roads have been constructed since American occupation.

Health and Sanitation. As a result of sanitary supervision, education and free medical treatment, the natives of American Samoa have increased in numbers 41 per cent under the American occupation, from 1900 to 1920. The prevailing diseases are hookworm, influenza, and filariasis. At various times there have been serious epidemics of measles. Malaria, cholera and smallpox are unknown in Samoa. The government maintains dispensaries and a sanitation inspector makes public inspection of all villages. As a result, health conditions in the island have remained good during the decade.

SAMUEL, HERBERT (LOUIS) (1870–). An English public official (see VOL. XX). He was chancellor of the Duchy of Lancaster for the second time in 1915–16 and also Postmaster General. In 1916 he became Secretary of State for Home Affairs and held other important offices. In 1919 he was British Commissioner to Belgium and in the next year became High Commissioner of Palestine, where the handling of a delicate situation caused by the fierce clashing of mutually hostile nationalities called forth all his ability in diplomacy and fair dealing. Up to 1924 he had succeeded in averting serious outbreaks. In 1917 he wrote *The War and Liberty*.

SAN ANTONIO. The largest city of Texas. The population increased 67 per cent from 96,614 in 1910 to 161,379 in 1920, and to 184,727, by estimate of the Bureau of the Census, for 1923. During the decade 1914–24, San Antonio became the centre of a large oil-producing territory. The first field was discovered in 1915 at Somerset, 18 miles south of the city; in 1919 it produced 95,000 barrels of oil; in 1923, 1,250,000 barrels. Large fields at Luling, Mirando, and Calliham were subsequently discovered. Seven junior high school centres were completed at a cost of $1,500,000. A bond issue of $4,150,000 was voted for public improvements, including $2,800,000 for a flood protection programme and an additional $200,000 to be added to the $500,000 previously voted for a municipal auditorium Building permits increased from $2,619,060 in 1919 to $8,672,029 in 1923. A heavy flood inundated the city in 1921 when Olmos Creek and the San Antonio River were swollen by prolonged and violent rains; this caused a property loss of about $10,000,000.

SANDBURG, CARL (1878–). An American poet and editor, born at Galesburg, Ill., and educated at Lombard College of that city. He served as a private in the war with Spain

in 1898, was secretary to the Mayor of Milwaukee, Wis., from 1910 to 1912, and in 1913 went to Chicago, where he became associate editor of the magazine *System*. He did newspaper writing for a while, received the Levinson Prize from the *Poetry Magazine* in 1914, and had a half share in the prize of the Poetry Society of America in 1919. One of the first to follow Masters in the use of free verse, Sandburg soon came to be recognized as the leader of the western poets. His verse was harsh and unrythmic; his themes tended to be brutal and showed too great a fondness for the so-called primitive character of American civilization; there were, perhaps, too many references to smokestacks, iron, grime, dirty alleys, and the like. But there was also beauty in his poetry and a sensitiveness which even his realistic preoccupations could not obliterate His writings include: *Chicago Poems* (1915); *Corn Huskers* (1918); *The Chicago Race Riots* (1919); *Smoke and Steel* (1920); *Slabs of the Sunburnt West* (1922); *Rootabaga Stories* (1922); *Rootabaga Pigeons* (1923).

SANDERSON, JULIA (1887–). An American actress and singer, born at Springfield, Mass. She made her début with the Forepaugh Stock Company in Philadelphia and in 1902 came to New York City, where she first appeared at the Casino in *Winsome Winnie* and later as Mrs. Pineapple in *A Chinese Honeymoon* and in other popular rôles. After playing in *The Honorable Phil* in London, she toured the United States as Dora Dale in *The Sunshine Girl*, appeared in the musical comedy *The Girl from Utah* with Donald Brian and Joseph Cawthorn (1915), and starred with the *Sybil* company (1916–17)

SAN FRANCISCO. The second city in California. The population increased from 416,912 in 1910 to 506,676 in 1920, and to 539,038, by estimate of the Census Bureau, for 1923. During the decade between 1910 and 1920, work was progressing on the Hetch Hetchy Water Supply System. For an account of this and other important developments in connection with its water supply, see AQUEDUCTS and WATER WORKS. The Panama-Pacific International Exposition, commemorating the opening of the Panama Canal, was held in San Francisco during nearly the whole year of 1915, from February 20 to December 4. Thirty-nine foreign nations and 40 States and territories were represented by industrial and artistic exhibits Of the elaborate buildings erected for the fair, the Municipal Auditorium, at the Civic Centre, was of permanent construction; it cost $1,086,000. The total cost of the fair was about $50,000,000. On the close of the exposition the grounds were converted into a residence park. Other buildings constructed at the Civic Centre during the decade included the $3,500,000 City Hall, a four-story building with a ground area of 278 by 415 feet and a central dome 112 feet in diameter, over 300 feet high; the Public Library, a building 190 by 305 feet, designed in Italian renaissance style, costing $1,153,000, and with a capacity of 500,000 volumes; and the State of California Building, erected at a cost of $1,350,000 to house State courts and other offices. Park Commissioner and Mrs. Adolph Spreckels gave the city a new Museum of Fine Arts, copied exactly from the Palace of the Legion of Honor in Paris. It contained exhibits of work by French, Belgian, Rumanian, Polish, Greek, and Jugo-Slav as well as native artists, and a collection of Sèvres porcelain and Gobelin tapestries

After careful study and mapping under the direction of the City Engineer, the City Planning Commission completed and secured the adoption in 1921 of an ordinance dividing the City into six use zones. In the same year the City Engineer began studies of the rapid transit system of the City, preparatory to making plans for a four-track subway to run for two and one half miles under Market Street, from the ferry to Valencia Street. The development of a large new residential area was made possible by the completion of a tunnel 12,000 feet long and an electric railway through Twin Peaks. After a series of hearings and investigation of the project and the various alternative plans presented, the United States War Department in 1923 gave permission, and work was started on the construction of a cantilever bridge across Carquinez Straits between Vallejo and Valcona, spanning one of the upper reaches of San Francisco Bay. It was to consist of a central pier and two 1100-foot spans and would be the third largest cantilever bridge ever constructed. It was for vehicular traffic exclusively. Permission was also granted for two vehicular bridges across the lower end of San Francisco Bay One was to have its western end at Little Coyote, about 24 miles by highway south of the City, and was to be six miles long and to cost about $10,000,000, including seven miles of approach roadway. The plans demanded a 200-foot lift span, a series of arches of 250-foot span across a mile of deep water, and shorter arches, trestle, and fill over the shallow water and tidal marsh. The other bridge was to be at Dumbarton. Various projects were discussed for connecting San Francisco and Oakland, and there were also under way for the spanning of the Golden Gate the world's longest cantilever bridge, to connect San Francisco with Marin and the other counties to the north.

The school system was thoroughly revised in 1922, following, for the most part, the recommendations incorporated in a report which the United States Bureau of Education made on the schools at the request of the city.

Among other accomplishments of the City of San Francisco since 1910 were the building of the first municipally-owned street railways in the United States. In 1924 the Municipal Railways had 68 miles of track; consistently maintained a five-cent fare; paid all interest charges on its bonds, amounting to $2,000,000 in 1923; retired bonds aggregating $1,090,900; earned the money to build extensions costing $1,791,208, and still had a credit in the City Treasury of $1,680,913. Two tunnels were bored beneath the city's hills, the Twin Peaks tunnel, 2¼ miles long, 25 feet wide, and costing $4,750,000; and the Stockton Street tunnel, 911 feet long, 50 feet wide, and costing $650,000. A $5,750,000 high-pressure fire protection system was installed. More than $20,000,000 in streets and boulevards were built and maintained. Fourteen new public playgrounds, with a combined area of 125 acres, were opened. The city also had the world's largest outdoor swimming pool, 1000 feet long and 150 feet wide. The San Francisco Hospital was built, a public institution ranking among the three largest and finest hospitals in the world. James Rolph, Jr., was elected mayor of San Francisco in 1912 and

was reëlected; his term was to expire in 1928. See RAPID TRANSIT.

SANGER, MARGARET H. (1883–). An American birth control advocate. She was active in birth control propaganda after 1914. Frequently arrested, she served a 30-day sentence in 1916. At other times her case was dismissed on appeal. Her first husband, the architect William Sanger, was also tried and convicted in the New York courts in 1915. Mrs. Sanger was editor of the *Woman Rebel*, which gave way in 1917 to the *Birth Control Review*. The latter publication, with a circulation in excess of 100,000, was the organ of the American Birth Control League in which were grouped prominent club women and social workers interested in the population question. Mrs. Sanger, as president of the league, directed an international propaganda for breaking down the taboos on birth control information. She lectured in various parts of the United States and in Japan, and called to her support English publicists like Harold Cox, editor of the *Edinburgh Review*, and Havelock Ellis. In New York her propaganda was at times opposed by prelates of the Catholic Church. After one meeting at the Town Hall was suppressed through the intercession of Archbishop Hayes, Mrs. Sanger held other meetings in which Catholic dignitaries were present. After the death of her first husband, Mrs. Sanger married, in 1922, J. Noah H. Slee, a capitalist who was interested in the activities of the Birth Control League. Besides writing numerous pamphlets, Mrs Sanger was the author of the following books: *What Every Girl Should Know* (1914); *What Every Mother Should Know* (1916); *The Case for Birth Control* (1917); *Woman, Immorality, and Birth Control; Woman and the New Race*, with a preface by Havelock Ellis (1920); *The Pivot of Civilization* (1922); *The New Motherhood*, with introductions by Harold Cox and Havelock Ellis (1922).

SANGSTER, MARGARET ELIZABETH (MRS. CARROLL M. SHERIDAN) (1894–). An American author, born in Brooklyn, N. Y. She became associate editor of the *Christian Herald* in 1913 and in 1918 she visited Belgium, Germany, and France as correspondent for that periodical. Her poems and stories include: *Friends o' Mine* (1913); *Real People and Dreams* (1914); *Cross Roads* (1919); *The Island of Faith* (1921); *Your Book and Mine* (1923).

SANKEY COMMISSION. See GREAT BRITAIN, *History*

SAN MARINO. A republic of Europe located in the peninsula of Italy. Area, 38 square miles; population, 12,027, in June, 1920, as compared with 10,489 in 1910. Revenues and expenditures for 1922–23 amounted to $165,405 and $173,830 (at current rate of exchange). In 1914 these were $193,541 and $125,232. There was no public debt. The treaty of friendship with Italy was renewed in 1914 and 1920. Representatives of San Marino were to be found at London, Paris, Rome, and Barcelona. San Marino was technically at war with the Central Powers for her citizens were permitted to enlist in the Italian army.

SAN REMO CONFERENCE. See REPARATIONS.

SANTAYANA, GEORGE (1863–). An American philosopher of Spanish extraction (see VOL. XX). He resigned from the faculty of Harvard University in 1912, and lived thereafter in England and on the continent. He collaborated in 1920 with a group of other American philosophers in the publication of the *Essays on Critical Realism*. Here the attempt is made to save philosophy from mentalism and scepticism through the revival of the classic distinction of essence and existence, both notions conceived as independent of the knowing subject. In his subsequent development, Santayana seemed to move away even from such critical realism. His *Scepticism and Animal Faith* (1923) and his "Preface to a System of Philosophy (*Yale Review*, 1924) show him replacing the immutable and eternal Platonic essences with relativistic knowledge, postulated by human faith and according to human needs.

His other works since 1914 include *Character and Opinion in the United States* (1921), a collection of *Soliloquies in England* (1922) and a war book, *Egotism in German Philosophy* (1915).

SANTO DOMINGO (DOMINICAN REPUBLIC). A West Indian state occupying the eastern part of the island of Haiti. The area is estimated at 19,332 square miles. The population in 1923 was 708,000; by the census of 1921, it was put at 897,405. The city of Santo Domingo, the capital, had 30,957 inhabitants. Agriculture and cattle-raising continued the chief interests of the population. Sugar estates were to be found in the southern part of the country; tobacco, cacao, and coffee were grown in the other sections. Sugar production in 1922–23 totaled 206,272 tons. The cacao yield in 1922 was 19,000,000 kilos. There was a great variety of minerals, the chief being gold and silver, but few were worked In 1913 the total trade was valued at $19,741,000; in 1920 it reached the high figure of $105,257,117. In the succeeding years it declined, falling to $45,199,375 in 1921 and $29,548,852 in 1922. The year 1921 was the only one in the period to show an adverse trade balance for the republic The preponderating share of the country's foreign trade fell to the United States. Exports from Santo Domingo to the United States for 1920, 1921, and 1922 were respectively 87 per cent of the total, 77 per cent, and 42 per cent. The last figure was occasioned by the small purchases of Dominican sugar because of the tariff and prevailing low prices. Thus, while in 1921 the United States imported 80 per cent of the Dominican crop, in 1922 the purchase was only 25 per cent. The United Kingdom and Canada took the remainder. In 1921 and 1922, American imports into Santo Domingo totaled 84 and 72 per cent of the whole. Sugar and cacao continued the leading exports. There was no additional railway building over the period. However, an excellent macadam road was opened in 1922 from Santo Domingo on the south coast to Monte Christi on the north coast (182 miles). In 1923 a similar road from San Pedro de Macoris to the capital (47 miles) was completed. Revenues and expenditures for 1913–14 were $5,035,250 and $4,890,216; for 1922, $12,164,142 and $11,353,686. The bonded debt of the country, on Dec. 31, 1922, stood at $14,800,203. Within the period 1914–24, loans for $1,538,200 (1918) and $6,698,485 (1922) were raised. Defense was in the hands of a native constabulary of 1200 men and 114 officers. American marines, stationed in Santo Domingo

in 1924, numbered 1881 men and 105 officers.

History. The much-needed internal peace which was to result from the American-Dominican fiscal treaty of 1907 came to a premature end with the assassination of President Ramon Caceres in 1911. Thereafter each year saw a new revolution and a new president. President Bordas, who had been elected in April, 1913, encountered a strong rebellion in the spring of 1914. When the situation had become a hopeless tangle in the late summer, matters were straightened out with the assistance of an American commission which had been sent to Santo Domingo for this special purpose. Bordas was induced to resign and Dr. Ramon Baez, the son of a former president, was elected provisional president on Aug. 27, 1914. In October of the same year ex-President Juan Isidro Jiminez was chosen constitutional president For a brief time it seemed as if he would be able to ensure an era of peace and prosperity, but it soon became apparent that he was too aged and infirm to cope with the elements of corruption and disorder. A new revolution broke out under General Arias, a chronic revolutionist of Monte Christi, early in 1916. When Arias seemed on the point of seizing the government, the United States, which by this time had grown thoroughly impatient with the interminable civil disorders and their attendant destruction of life and property and harm to American and other foreign interests and had become alarmed by the danger of international complications, landed marines and took control in Santo Domingo. President Jiminez, who had approved American intervention but had become dismayed at the turn of affairs, resigned on May 6, 1916, and left the country, while General Arias was summarily ousted by the American commander. The complete pacification of the interior by the American forces was rapid and without serious opposition from the native population. On July 25, the Dominican Congress chose as temporary president Dr. Francisco Heriquez Carvajal, a man of outstanding ability and character. In view of the failure of the 1907 treaty to ensure peace and the security of property, the United States decided to exact guarantees against the recurrence of disorders in the future and hence made its recognition of Henriquez contingent on the conclusion of a new American-Dominican treaty modeled after the treaty signed between Haiti and the United States in 1915. The principal features of the new treaty were to be provisions for the collection of customs under American supervision, the appointment of an American financial adviser, and the installation of a constabulary force officered by Americans. On the refusal of President Henriquez to accede to this request, on the ground that the proposed treaty constituted a flagrant infringement of the sovereignty of the Dominican Republic, the American authorities proceeded to compel compliance by withholding all Dominican revenues from the government. This brought about complete paralysis of the whole governmental machinery. When it became apparent that President Henriquez intended to stand for reëlection at the expiration of his temporary term, with good prospects of success, the existing deadlock threatened to continue for an indefinite period. To end an impossible situation the American commander issued a proclamation declaring the Dominican Republic under the military administration of the United States. Immediately thereupon the military government took full possession of the country, and what little opposition there was met with rapid suppression.

During the American occupation, Santo Domingo enjoyed a wholesome quiet after the many years of internal disturbances, and a notable improvement was made in social and economic conditions. Most important among the many reforms were the construction of many miles of good roads, the enactment of new tax and revenue laws, the settlement of claims outstanding against the Dominican government, the creation of an efficient police force, the building of new schools, and the enforcement of strict sanitary regulations. Notwithstanding these obvious benefits, the Dominican people maintained their passive resistance and the spirit of resentment which they had manifested when they rallied around President Henriquez in 1916. Only the recognition of the utter futility of an armed conflict prevented them from offering armed resistance. No economic betterment could in their eyes offset the existence of the hateful occupation and the distasteful occurrences which went with it. The practical exclusion of the Dominicans from participation in the government, the overbearing conduct of many of the American military officers, the arbitrariness of the provost courts, reports of acts of cruelty and brutality on the part of American soldiers, all served to fan a spirit of violent resentment and opposition against the occupation. Off and on, loud protests were voiced by the Dominicans against American intervention and the very considerable loan which they were pressed to float.

Evacuation of the Dominican Republic by the American forces was foreshadowed by the proclamation issued by the military government on Dec. 28, 1920, stating that "the time has arrived when it (the military government) may, with a due sense of its responsibility to the people of the Dominican Republic, inaugurate the simple process of its rapid withdrawal from the responsibilities assumed in connection with Dominican affairs." At the same time it was announced that a commission of representative Dominicans with a technical adviser would be appointed to prepare the constitutional amendments and to revise the laws of the Republic and that these laws, after approval by the military government, would be submitted to a constituent assembly and to the national congress. On June 14 a similar proclamation was issued, outlining the conditions under which the withdrawal would be made After a long delay due to the refusal of the Dominicans to accept the American conditions, an American-Dominican accord was signed on June 30, 1922, which, aside from the establishment of a provisional government, stipulated that a treaty should be concluded between the United States and the new Dominican government, whereby the latter should recognize the validity of all acts of the American military government during the occupation, of the bond issues of 1918 and 1922, and of the convention of 1907, the latter to remain in effect for the time during which the 1918 and 1922 bond issues remained unpaid. Pending the establishment of a permanent government, Juan Bautista Vicini Burgos assumed office as provisional president on Oct. 21, 1922. Subsequently Gen. Horatio Vasquez, who was perhaps the outstanding figure in Dominican po-

litical life, was elected constitutional president. On June 26, 1924, the Dominican Congress ratified the treaty with the United States which provided for the withdrawal of the American forces, and simultaneously it was announced from Washington that the withdrawal would commence as soon as possible after July 10, 1924

SARAWAK. See STRAITS SETTLEMENTS.

SARAZEN, EUGENE (?-). Professional golf player. He learned the game as a caddy and in 1922 captured the American open championship and followed this up a few weeks later by carrying off the honors in the American professional championship. He successfully defended his professional title in 1923.

SARGENT, JOHN SINGER (1856–1925) An Anglo-American artist (see VOL. XX). His portrait of Henry James was one of the paintings attacked by the suffragettes in London in 1914. The third series of his mural decorations in the Boston Public Library, finished in 1916, was entitled "The Theme of the Madonna." He made several paintings of scenes on the western front during the War. His large picture, "Gassed," in the Royal Academy, attracted great attention. In November, 1921, his decorations in the rotunda of the Boston Museum of Fine Arts were unveiled.

SARRAIL, MAURICE (1856-). A French general (see VOL. XX). At the beginning of the War he commanded the 6th Corps, and on Sept. 2, 1914, he was appointed commander of the 3d Army. At Verdun, although authorized and even commanded to fall back, he held his army on the northwestern front, which helped to make Joffre's counterattack possible. He later became commander-in-chief of all the Allied forces in the East but was recalled to France in 1917, and in April, 1918, he was put on the reserve list as having reached the age limit. Soon after the end of the War he published an account of the Saloniki operations, under the title, *Mon Commandement en Orient.*

SARTORIUS VON WALTERSHAUSEN, AUGUST, BARON (1851-). A German economist (see VOL. XX). He published *Der Paragraph 11 des Frankfurter Friedens* (1915); *Weltwirtschaft und Weltkrieg* (1915); *Deutschland und die Weltwirtschaft nach dem Kriege* (1922); and continued his *Deutschlands Wirtschaftsgeschichte* from 1913 to 1920.

SASKATCHEWAN. A Canadian Province, with an area of 251,700 square miles, and a population in 1921 of 757,510. The latter was a gain of 265,078 or 53.8 per cent over the figures for 1911. Of the population in 1921, 538,552 (71 1 per cent) lived in rural districts and 218,958 in urban. In 1921, males numbered 413,700 and females 343,810. Settlers of American origin in 1916 numbered 87,907. There were considerable colonies of Germans, Austrians, Scandinavians, Russians, and Dutch. Populations of the larger towns in 1921 were: Regina, the capital, 34,432; Moose Jaw, 19,285; Saskatoon, 25,739; Prince Albert, 7558.

Industry. Because of the prairie nature of the country, agriculture was the leading occupation. By 1923 the acreage devoted to wheat had increased to 12,791,000 acres from the 5,720,000 acres in 1912. Saskatchewan was the leading wheat-producing Province. The acreage under oats, barley, rye, potatoes, also doubled at least during the period. As a result of the diversified farming practiced and the attention given to root crops, etc., the live stock industry thrived. In 1923 there were 403,813 milch cows (204,624 in 1914), 1,131,274 other cattle (474,436 in 1914), 137,240 sheep (126,027 in 1914), 679,867 swine (454,703 in 1914). The value of agricultural products for 1923 was $291,439,000, as follows: field crops, $248,778,000; dairy products, $19,366,000 (compare the 1910 product of $381,809); wool clip, $142,000; game and furs, $7000; garden products, $2,461,000; poultry and products, $8,670,000. Under the spur of an enlightened self-interest, farmer organizations applied themselves to coöperative grazing schemes and cooperative elevators. In 1922, 332 elevators handled a total of 37,335,337 bushels of all grains. The extensiveness of the idea may be gained from the fact that shares in these enterprises were held by 23,014 persons. Other industries yielded: fish catch (1921), $243,018; coal, (1922) $802,053 In 1921, there were 2027 industrial establishments, concerning themselves primarily with milling and building operations, capitalized at $34,794,506 and adding to products by manufacture, $20,723,666. Employees numbered 7235; salaries and wages paid, $8,842,286. The water-power resources were estimated at 513,481 horse power but by 1922 practically none of this had been utilized.

Trade and Communications. Animal products and grains were the Province's leading exports. Exports for 1922–23 amounted to $12,777,000; imports, $10,716,000. In 1922 there were 6267 miles of railway in operation as compared with 5654 miles in 1914.

Government. Revenues for 1921–22 totaled $11,801,894 as compared with $4,668,754 in 1913; expenditures for 1913 and 1921–22 were $4,656,800 and $13,322,119. In 1922, in the 4543 elementary and secondary schools, 183,935 pupils were enrolled (99,109 pupils in 1913). High schools were attended by 5627 pupils. Total expenditures for education in 1913, $8,787,904; in 1921, $15,612,331. The provincial representation in the Dominion Senate was increased to six members. For 1920–21, receipts from the Dominion government (subsidy and school lands) amounted to $3,088,646. Women received the franchise in 1916 and were made eligible for election to the provincial legislature.

SATELLITES. See ASTRONOMY.

SATIE, ERIK (1866–1925). A French composer, born at Honfleur, France. Although he received musical instruction from the age of eight, and had good teachers, he neglected his opportunities. After leaving the Paris Conservatory, where he was regarded as hopeless, he played in various cabarets in Montmartre until about 1890 He then met Josephin Péladan, a writer and leader of a mystic cult, the Salon de la Rose-Croix, which he joined in 1892. The next two years he spent writing incidental music for the plays of Péladan and other members of the salon, and thus began to realize the inadequacy of his technical equipment. He entered the Schola Cantorum, and nothing was heard of him until 1911, when Ravel played some of his piano pieces. Satie began as an extreme impressionist and rapidly drifted into Futurism. He wrote mainly for piano, his works being as eccentric and extravagant as their titles (e.g. *Aperçues Désagréables, En Forme de Poire, Pièces Froides,* etc.). He also wrote two ballets, *Upsud* and *Quadrille.*

SAULT SAINTE MARIE, CANALS AT. In

1914 the United States St. Mary's Falls Canal had its facilities increased by the completion of a third lock, known as the Davis lock, which was opened to commerce on October 21. This lock was 1350 feet in length between gates, with a usable length of 1300 feet, and had a width of 80 feet and a minimum depth of 24.5 feet over the sill. This lock was a part of a new separate canal on the American side with a width of 200 to 300 feet and by its increased depth made it unnecessary for the heaviest draft vessels to use the Canadian canal as was previously sometimes required, for there was only about 18½ feet at low water through the Poe or second American lock. The new canal was crossed by a long bascule bridge carrying a railway track. Another feature of this canal was a fourth lock, of the same dimensions as the third. This fourth or Sabin lock, named for the general manager of the canal, L. C. Sabin, was completed after various delays due to the War and opened to traffic on Sept. 18, 1919. It is operated by electricity and but 8 minutes are required to raise or lower the craft in the lock a distance of 20 feet Two of the largest lake freighters can be accommodated tandem on these long locks. In 1916 a record was made of 25,407 vessels with a registered net tonnage of 69,824,463 passing through the American and Canadian canals with a total of 91,888,219 tons of freight. This record can be compared with the statistics for 1923 when 21,975 vessels passed through the canals with a net tonnage of 68,546,412 and 91,379,658 tons of freight.

SAUVEUR, ALBERT (1863–). An American metallurgist (see VOL. XX). He was metallurgist attached to the American Aviation Commission in France during 1917–19 and was appointed metallurgical expert to the French Ministry of Munitions in 1917.

SAVOY, UPPER See SWITZERLAND.

SAWYER, ROLAND DOUGLAS (1874–). An American clergyman, born at Kensington, N. H., and educated at Boston University. Besides his ministerial duties, he conducted a crusade against profanity during 1902–07, and organized the Anti-Profanity League. He was also active in Socialist politics, lectured for the Socialist party, and was Socialist candidate for governor of Massachusetts in 1912 He was elected to the Massachusetts Legislature on the Democratic ticket in 1914 and was reëlected till 1921. His writings include: *The Making of a Socialist* (1911); *Social Science of Jesus* (1912); *Walt Whitman, the Prophet Poet* (1913); *'Neath Swaying Pines* (1916); *Thoreau, New England Philosopher* (1917); *The Great Teachers of Wisdom and Virtue* (1920); etc.

SAWYER, RUTH (MRS. ALBERT C. DURAND) (1880–). An American author, born at Boston, and educated at Columbia University. In 1908 she began professional story telling and later wrote short stories, particularly Irish folk tales. She wrote: *The Primrose Ring* (1915); *Seven Miles to Arden* (1916); *Myself* (1917); *A Child's Year Book* (1917); *Doctor Danny* (1918); *Leerie* (1920); *The Silver Sixpence* (1921); *Gladiola Murphy* (1923); *Tale of the Enchanted Bunnies* (1923).

SAXONY. The internal situation in Saxony remained comparatively calm during the first years of the War. In 1917, however, it assumed a disquieting aspect, and a strong movement for internal reform and an early peace began. It accumulated force during the following year and brought about the fall of the government in October, 1918. The career of the succeeding government, the Heinze ministry, was cut short by the November revolution, in the course of which King Friedrich August abdicated and a republic was proclaimed. During the confusion of the early revolutionary period, the government was in the hands of People's Commissioners representing the extreme Socialists, but after the disturbances and upheavals of January, 1919, the reins of government were taken over by the Majority Socialists. The radicals in the country, which long before had earned for itself the sobriquet of "Red Saxony," were not willing, however, to relinquish the realization of their dreams without a serious struggle. New risings took place and after a series of sanguinary conflicts a Soviet republic was declared in Leipzig during April, 1919, which was crushed by the Reichswehr during the following month. Thereupon Saxony entered into a more peaceful period until the Kapp Putsch, which threw the country once more into violent disorder. Serious communist risings occurred throughout Saxony and especially in the Vogtland, where the communist bandit, Max Hölz, ruled for a while in a Robin Hood manner. Again the Reichswehr had to be called in to reestablish the authority of the Dresden government. At this time the ministry, consisting, since October, 1919, of a coalition of Majority Socialists and Democrats, was replaced by a coalition of the two Socialist parties A new constitution was adopted on Oct. 26, 1920, and in accordance with its provisions elections for the Diet were held during the following month, which cut the representation of the Majority Socialists by nearly one-half The Majority Socialists obtained only 27 seats against 47 for the bourgeois parties but the combined popular vote for the former two Socialist parties was 1,029,083 against 1,011,108 for the bourgeois groups. In consequence of their increased representation, the latter were able to maintain a vigorous parliamentary opposition against the Socialist government.

After a period of comparative calm in 1921 and 1922, "Red Saxony" came once more into the limelight in the fall of 1923, at a time when the Reich was in a very critical situation and reaction and monarchism were rampant in the neighboring state of Bavaria Ostensibly as a counter-movement against the peril of Bavarian nationalism, the Socialists received avowed communists into the cabinet and "Proletarian Hundreds" were organized to fight reaction and to spread revolutionary terror. This action soon brought the Saxon Prime Minister, Dr. Zeigner, into conflict with the Reichswehr and the Minister of National Defense for the Reich. When the Saxon Minister of Finance, Dr. Böttcher, who was an out and out communist, called on the "Proletarian Hundreds" to arm, the government of the Reich decided to take action. The commander of the Reichswehr in Saxony demanded from Dr. Zeigner the dismissal of the communist ministers and the submission of Saxony to the authority of the Reich. Upon the refusal of the Saxon Premier to comply with these demands the Reichswehr marched into Saxony on Oct. 22, 1923, and the whole Zeigner ministry was dismissed. The central government installed thereupon a moderate So-

cialist ministry. Dr. Zeigner was subsequently brought to trial for private offenses committed while in office.

The result of the suppression of radical socialism in "Red Saxony" was on the one hand a consolidation of the communist elements and on the other the discrediting of moderate socialism and a considerable shift to the Right. In the municipal elections of Jan. 13, 1924, the Social Democrats suffered defeat at the hands of the bourgeois parties In the course of 1924, the internal situation in Saxony, as elsewhere in the Reich, improved materially, notwithstanding the serious lockouts in Chemnitz and Zwickau in the early summer, which were part of an extended conflict in the Reich between employers and workers over the lengthening of work hours.

SAYLER, OLIVER MARTIN (1887–). An American dramatic critic born in Huntington, Ind. He was graduated from Oberlin College, Ohio, in 1909, and during 1909–20 worked on the *Indianapolis News* After 1915 he was correspondent for the *Boston Evening Transcript*. He studied the theatres of Europe and gave extended lectures on Russia and on the theatre. He is the author of *Russia, White or Red* (1919); *The Russian Theatre under the Revolution* (1920); *Our American Theatre*, a comprehensive study of the condition of the theatre in the United States viewed from the standpoint of producer, actor, audience, and stage technician

SAZONOV, SERGIUS DMITRIEVITCH (1866–). A Russian statesman. He was educated at the Alexandrovsky Lycee, and although convinced of the necessity of reforms, he nevertheless supported the old order. His first diplomatic post was that of Counselor of the Embassy in London, where he assisted Count Benckendorff in cementing friendship between his country and Great Britain. Afterward he was Russian Minister at the Vatican and later Minister of Foreign Affairs in St. Petersburg, at a time when Russia was disentangling herself from the aggressive policy of Germany. Sazonov showed patience, skill, and firmness in resisting German pressure without giving offense, at the same time strengthening the bonds uniting Russia and Great Britain. With the Czar he did his utmost to avert the War, but when it came he proved loyal throughout to the Entente cause. He opposed assumption of the army command by the Czar and also sought to placate the Poles by home rule. This last measure was countermanded, and Sazonov was dismissed After the revolution of March, 1917, it was planned to send him to London to represent the provisional government, but the fall of Milyukov defeated the project. Kolchak made him minister of foreign affairs, and he made an unsuccessful trip to London to win recognition of Russia.

SCANDINAVIAN LITERATURE. Danish. Jóhann Sigurjónsson, who died in 1919, held the foremost rank among twentieth century Danish-Icelandic dramatists His plays, based on Icelandic history and legend, show a strong love for Icelandic nature and Icelandic character, both of saga and contemporary times. Henri Nathansen was generally considered the greatest Danish dramatist of the day. One of his favorite themes is the contrast between Jew and Gentile. Einar Christiansen writes somewhat in the manner of Ibsen. Like Otto Benzon, he often portrays the conflict between the old and the new.

Among the poets, Ludvig Holstein, although a lyricist, usually conceals his own personality. His poetry often expresses a love for nature, particularly spring. Johannes Jorgensen was considered by some the greatest living Danish poet. A Catholic convert, he gives expression in his poetry as well as in his prose to his soul experiences and religious sentiments. L. C. Nielsen was attempting to create a modern national poetry. He is the writer of a number of cantatas of great power and is the interpreter of the lonely, the wanderer, and the lover. In the poetry of Kai Hoffmann is seen a love for life and for everything living. Olaf Hansen's is largely poetry of reminiscence Other poets of note are Sophus Claussen and Thøger Larsen.

Danish fiction suffered a great loss in the death of Jakob Knudsen in 1917. Johannes V. Jensen was one of the foremost writers of Denmark. Influenced at times by Walt Whitman, and a strong believer in the soundness of northern life and tradition, Jensen became interested in a Gothic renaissance In his later works (*Brœen, Norne-Gœst, Kongens Fald*), he pictures Danish life, particularly from Viking times. Otto Rung is characterized by his clear and firm thinking, his original interpretation of human nature, his thrilling action, and his subtle psychology. A writer touching on social conditions is Henrik Pontoppidan. He does not preach; yet his sympathies are clearly with the under class. His series, *De Dødes Rigs*, beginning with *Torben og Jytte* and ending with *Favsingholm*, portrays different phases of the struggle between the people and their oppressors. Martin Andersen Nexø is another writer interested in social problems. Among his later works may be mentioned *Ditte Menneskebarn*, a series treating the history of a family and constructed on large lines, and *Pelle Eroberen*, the story of a poor boy who grows up to be a leader of the workingmen. More strongly felt are the tendencies toward preaching a social gospel in the works of Jeppe Aakjær, whose *Hoor der er Gœrende Kræfter* may be interpreted as warning the leisure class against a possible rebellion of the peasants. In *Jens Langkniv*, Aakjær tries to portray in a single village the general history of Denmark. His stories usually centre around a character, a cause, or a view of life. Karl Gjellerup, who died in 1919, was originally a theologian and then went over to a rationalistic view of life, to end up with an ethical-religious philosophy In his novels, Gjellerup's learning often seems oppressive and distracts from his story. His *Den Gyldne Gren* depicts the conflict between heathendom and Christianity. Kund Hjortø finds his strength in his keen perceptions as a philologian and a psychologist. Of his later works may be mentioned the novels *Fru Herba* and *Tvelys*, and the collection of short stories, *Ud for Skrænten*. Of the Icelandic immigrants writing in Danish, the most important is Gunnar Gunnarsson, who shows vividly the disharmony, the gloom, and the passion of the soul-life of the Icelander, and also his lighter mood Among his works are the series *Borgslægten Varg i Veum, Edbrødre*, which goes back to early times, and *Salige er de Enfoldige*.

In linguistics, Otto Jespersen held a prominent place not only in Denmark but in the

world. In the field of literary criticism should be mentioned Georg Brandes, who in addition to Scandinavian has treated other literatures, ancient as well as modern; Vilhelm Andersen; and Valdemar Vedel.

Norwegian. Gunnar Heiberg was considered the greatest Norwegian dramatist of the period. His strength lies in the portrayal of strong sentiments and feelings. Another outstanding playwright was Hans E. Kinck. The drama also received contributions from others whose chief work lies outside this field, such as Herman Vildenvey, Nils Kjær, Vilhelm Krag, and Johan Bojer.

Norwegian poetry, even when written in Landsmaal, has retained many of the Danish characteristics and in general shows foreign influence. In spite, however, of its lack of a distinctly national character, it is very strong. In the period under review, foremost among lyric poets stood Olaf Bull, who expresses feelings for nature and love with exquisite tenderness, and Nils Collett Vogt, who is strongly subjective and whose *Hjemkomst* is his ripest and deepest poetry. Other noted lyricists were Vilhelm Krag, the representative of neoromanticism, and Knut Hamsun, whose main field, however, is the novel Herman Vildenvey owed his popularity to his roguish humor. Among poets writing in Landsmaal were Olaf Ankrust, whose *Himmelvarden* is one of the best poems in Landsmaal literature, and Kristoffer Uppdal, who comes nearest to writing a national poetry and whose verse in general is free from the Danish characteristics noted above.

Hans E. Kinck was regarded by some as the most important living Norwegian author. At heart a romanticist, he is yet interested in the world of reality and its problems. In the field of fiction, his *Sneskaflen Brast*, a novel built on very broad lines and strong in social psychology, is an epoch-making work. Nils Collett Vogt, besides being a novelist, is a dramatist and a poet. Johan Bojer, whose *Den Store Hunger* made him known internationally, upholds idealism against materialism and generally shows the victory of optimism over pessimism. Another novelist known outside of Norway is Knut Hamsun, whose *Markens Grøde*, expressing the dream of an ideal state in nature, seems a reaction against the War. The best-known woman writer of the period was Sigrid Undset, whose *Kristin Lavransdatter* gives in three volumes the story from childhood to death of a fourteenth century girl. Sigrid Undset is particularly interested in the problems of her own sex. The same is true of Barbra Ring, author of *Før Kuldenkommer*, *Under Sejl*, *Søstre*, etc., who treats woman's side of married life and evinces a love for the soil and the agrarian class. Kristian Elster, in his works *Landeveien*, *Ilden*, *Guldet og de Grønne Skoger*, etc., protests against existing conditions and the prevailing philosophy of life. Among prominent novelists should also be mentioned Gabriel Scott and Johan Fredrik Vinsnes. Of Landsmaal writers we may note Arne Garborg, also a poet, the leader of the Landsmaal movement; Oskar Braaten, who is particularly interested in life among the poorer classes; Kristoffer Uppdal, who even in his prose evinces strongly lyric tendencies; and Olaf Duun, who shows an intimate knowledge of peasant life.

Halvdan Koht is a scholarly writer on historical and literary subjects. Among literary critics should be mentioned Gerhard Gran, the editor of *Edda*, founded in 1914; Christen Collin, and Fredrik Paasche.

Swedish. The Swedish drama was not very strong during this period The theatre drew largely on foreign and earlier Swedish plays. Among the best contemporary dramatists were Tor Hedberg, who also excelled in other fields of literature, and Per Hallström.

The greatest living Swedish poet was Verner von Heidenstam. He is an idealist, fond of portraying the conflict between good and evil and interested in Swedish history and its heroes. Through his poetry breathes the spirit of patriotism, which is, however, largely an extension of his love for his birthplace. In addition to being a poet, Heidenstam wrote several novels, particularly on historical subjects; these antedated 1914. Matts Magni Granström at times shows the influence of Runeberg. He emphasizes the spiritual and touches on the relation between the subjective and the objective and on man's intimate connection with nature. Among his works may be mentioned *Visor i Byn* and *Hat och Karlek*. Daniel Fallström is a writer of love-lyrics; he also describes nature, particularly the surroundings of Stockholm. Swedish lyric poetry was strongly represented in Finland In this connection four men were outstanding. Preeminent among these was Bertel Gripenberg, a portrayer of strong feelings, hate as well as love. His verses are full of the spirit of fight Among his later works we may mention the collection *Under Fanan*, written under the inspiration of the civil war in Finland. Jacob Tegengren is deeply sensitive to nature, particularly to its spring and summer. He is quiet and dreamy, the melancholy of his earlier years having given way to a more joyful tone. Among his later poems may be noted "Ny vår." Arvid Mörne's poetry is often inspired by a love for his native place, its nature, and its people. But Mörne is also an agitator, fighting now for this cause, now for that, this often gives his poetry an argumentative coloring. He has also shown ability in the drama and novel. Hjalmar Procopé, the last of the Swedish writers in Finland to be mentioned here, has no definite philosophy of life His poetry is quiet and characterized by a mild and manly resignation.

The author who was considered by most critics the greatest living writer of Swedish fiction was Hjalmar Söderberg. The chief strain running through his works is pessimism. His irony and wit as well as certain features of his technique show French influence. Next in rank is Per Hallström, also a dramatist, whose works show a very strong power of imagination and keen psychological insight. Selma Lagerlöf is an extremely popular author, well known also outside of Sweden. Her work is characterized by a rich imagination, a love for her native province of Värmland, a strong power of story-telling, and a wholesome moral tone. Best known of her works is *Gösta Berlings Saga;* of her later works we may mention *Kejsaren av Portugallien*, *Bannlyst*, and *Mårbacka*. K. G. Ossiannilsson, who is also a poet, is interested in the problems of society, particularly in class struggles. Marika Stjernstedt is interested in her own sex, especially in the strong, independent woman placed in contrast with her weak

and submissive sister. Some of her late books are *Aventyrensland; En Officershistoria; Varlden och Stjarnorna*, picturing the attainment of peace through struggle; and *Bakom Disken*. Pär Lagerkvist is an author whose place has not yet been determined. He leans somewhat toward impressionism, is strongly original, and has a very productive imagination. Among his late books may be mentioned *Det Eviga Leendet* and *Den Lyckligesvag*. Martin Koch is a writer with a social message. He shows strong sympathy for the lower classes, whose lives he likes to depict, as seen in *Guds Vackra Varld* and *Anteckningar På Havet*. In religion he favors an everyday practical faith rather than dogmatism and formalism. Elin Wägner generally has a thesis in her works, although in her later books she leans somewhat to the novel of character. Among these later works are *Helga Wisbeck, Lakare; Den Befriade Karlchen*, and *Den Namnlosa*, the last-named showing the influence of Strindberg and Dostoyevsky. Henning Berger is especially fond of the emigrant to America whom he treats in several of his stories. His characters usually have something of the legendary, and in general his novels are permeated by a note of earnestness and melancholy. Tor Hedberg is one of the strong writers, not only of fiction but also of drama, poetry, and criticism. Sven Lidman is interested in memories and traditions. Of his later works may be mentioned *Huset med de Gamla Froknarna* and *Såsom Genom Eld*. Among humorists should be mentioned Albert Engström, whose humor and keen understanding of Swedish character made him a favorite with the people, and Hjalmar Bergman, whose *Markurells i Wadkoping* carried him to the height of popularity.

Nathan Söderblom, the archbishop of Sweden, contributed to the subject of religion, its origin, development, etc. Adolf Noreen had become internationally known for his linguistic investigations. Among literary critics were Henrik Schück, Karl Warburg, John Landquist, and Fredrik Böök.

SCAPA FLOW. A small body of water nearly enclosed by the Orkney Islands, about 14 miles long varying from 3 to 8 miles in width. The principal channels leading out are through Hoy Sound into the Atlantic Ocean and through Holm Sound into the North Sea. Each is about 2 miles wide. The best anchorage is on the north coast of Hoy, but there are several others. Scapa is over 50 miles farther from the German coast than Rosyth (q.v.), but the great ease of entrance and exit for a large fleet caused its use during the War as the operating base of the British Grand Fleet. It was in Scapa Flow that the surrendered German fleet was interned and where it was scuttled by its officers. See WAR IN EUROPE, *Naval Operations*.

SCARBOROUGH, GEORGE MOORE (1875–). An American playwright, born at Mt. Carmel, Texas, and educated at the University of Texas. From 1897 to 1905 he practiced law in Texas, then became a reporter for the New York *American*, and was with the Department of Justice from 1909 to 1914. His first play, *The Lure* (1913), attracted much attention. Among his other plays are: *At Bay* (1913); *The Court of Last Resort* (1913); *What Is Love?* (1914); *The Heart of Wetona* (1916); *Moonlight and Honeysuckle* (1918); *The Son-Daughter* (1919); *Bluebonnet* (1920); *The Mad Dog* (1921); *Mrs. Hope's Husband* (1921); *The Grail* (1922).

SCARLET FEVER. In 1923 and 1924 more was learned of the intimate nature of this disease than within the previous 50 years. During that period it had been taught that scarlet fever per se is not a severe disease but that it paves the way for secondary infections with the streptococcus. These complications are responsible for the wave of deafness, kidney disease, etc., that follows it. But the labors of independently active researchers—Dick and Dick; Dochez, Sherman, and Blake; and Trask and Lynch—which were published in 1923 and 1924 in the *Journal of the American Association*, all point to the same conclusions. Scarlet fever is due solely to a special strain of the hemolytic streptococcus, which flourishes only in the tissues of scarlet fever patients and possibly in so-called immune carriers. This organism is the cause alike of the disease and of its destructive complications. From first to last its pathogenesis shows the same nature and largely the same manifestations as diphtheria, which so closely resembles it in its clinical expression. This indicates that the disease is largely the result of an intoxication by the secretions arising from the bacterium, so that scarlet fever takes its place with those affections which can be reached by an antitoxin. Other members of the group to date comprise diphtheria, tetanus, botulism, one form of anthrax, etc. From analogy it should be possible to recognize those predisposed to the disease, to immunize against it, and to cure patients already infected, provided the antitoxin can be used seasonably. The conditions have been realized perfectly in the laboratory and in experimental work on volunteers, but application in daily ordinary practice will require several years

SCHÄFER, DIETRICH (1845–). A German author and historian (see VOL. XX). Like most of the historians of his country, after 1914 he wrote only works dealing with the War and the problems of Germany. They include: *Sein oder Nichtsein* (1914); *Deutschland und Frankreich* (1914); *Das Deutsche Volk und der Osten* (1915); *Staat und Volk* (1915). *Deutschland und England in See-und Weltgeltung* (1915); *Die Kultur und Ihre Aufgaben* (1917); *Die Vereinigten Staaten als Weltmacht* (1917); *Russland* (1918); *Wir Deutschen als Volk* (1918); *Die Schuld am Kriege* (1919); *Die Schuld an der Wiedergeburt Polens* (1919).

SCHEIDEMANN, PHILIPP (1865–). A German Socialist leader, born at Kassel. After attending the Burgerschule and the Realschule of his native town, he learned the printer's trade, and later became editor of a Socialist paper at Giessen and then of others at Nürnburg, Offenbach, and Kassel. In 1903 he was elected to the Reichstag, representing Solingen, and became a leader of the Social-Democratic party. He supported the government in its war policy, which greatly displeased the Minority or Independent Socialists. In 1918 he was elected vice president of the Reichstag and was made secretary of state without portfolio in October of that year. His party was said to have been willing that the monarchical form of government should be continued in Germany under a regency, but the Independent Socialists were determined on a republic; and their efforts were so successful that they were admitted in equal numbers in the provisional government,

They denounced Scheidemann for his willingness to retain the services of reactionary officers and troops for the suppression of Communist disorders. When the National Constituent Assembly met at Weimar on Feb 6, 1919, he was elected vice president of the Republic. After guiding the new government through the troubles of the first half of 1919, he resigned on July 20, as he could not agree to the signing of the Treaty of Versailles. He took up again the leadership of the Majority Socialists in the National Assembly and afterward in the republican Reichstag. In 1920 he was elected chief burgomaster in his native town.

SCHELDT RIVER CONTROVERSY. See NETHERLANDS

SCHEPPEGRELL, WILLIAM (1860–). An American laryngologist and one of the world's authorities on hay fever. Born in Hanover, Germany, he was educated in the State College of South Carolina and after taking a medical degree settled in New Orleans in 1890, devoting himself to the ear, nose and throat. He began to write on hay fever in 1909 and published many articles on the subject, some of them in the United States Government *Bulletins* (United States Public Health and Service). He was for some years president of the Hay Fever Prevention Society, and has made numerous additions to the armamentarium of his special work, notably in connection with the use of electricity His major writings are *Electricity in the Diagnosis and Treatment of Diseases of the Nose, Throat and Ear* (1898) and *Hay Fever and Asthma* (1922).

SCHICK, BELA (?–). A Hungarian bacteriologist and pediatrist known for his discovery of the special reaction to diphtheria toxin of children who are susceptible to the disease, which is now in general use throughout the civilized world by health officers He also discovered the existence of a peculiar toxic substance in menstruating women termed by him menotoxin. Schick was formerly an assistant to the well-known Vienna pediatrists Escherich and von Pirquet He has made numerous valuable contributions to periodical literature, but his major works are limited to *Scharlach* (Escherich and Schick) in 1912 and *Die Serumkrankheit* (von Pirquet and Schick) in 1905

SCHICK TEST. See DIPHTHERIA.

SCHINDLER, KURT (1882–). An American choral conductor, born in Berlin, Germany. He was trained in Berlin under K. Ansorge (piano), L Bussler, and F Gernsheim (composition), and studied under L. Thuille in Munich. From 1902 to 1903, he was conductor at the opera in Stuttgart, later in Würzburg, and from 1905 to 1907, was assistant conductor at the Metropolitan Opera House. In 1907, he became reader and critical adviser for G Schirmer In 1908, he founded in New York the MacDowell Chorus, which in 1910 became the Schola Cantorum This organization introduced many important novelties. Schindler is considered a specialist on folk music, of which he published several collections. His original compositions consist of about 50 songs and a choral ballad, *The Miracle of St. Raymond.*

SCHLATTER, ADOLF VON (1852–) A German theologian and author (see VOL. XX). His recent publications include: *Die Christliche Ethik* (1914); *Die Korinthische Theologie* (1914); *Die Martyrer in den Anfangen der Kirche* (1915); *Die Beiden Schwerter* (1916); *Luthers Deutung der Romerbriefe* (1917); *Die Entstehung der Beitrage zur Förderung der Christlichen Kultur* (1920).

SCHLESINGER, ARTHUR MEIER (1888–). An American educator, born at Xenia, Ohio. He was graduated from the Ohio State University in 1900 and took postgraduate courses at Columbia. From 1911 to 1919, he was professor and assistant professor of history at Ohio State University, and in 1919 became professor of history and head of the department of the State University of Iowa. He was a member of many historical societies and wrote (with H C. Hockett) *A Syllabus of United States History* (1915); *The Colonial Merchants and the American Revolution, 1763–1776* (1918), *Salmon Portland Chase* (1919); *New Viewpoints in American History* (1921). Professor Schlesinger edited *Great Charters of Americanism* (1920), and was also editor of the State of Iowa *Studies in Social Science*

SCHLESWIG. This small duchy (area, 3385 square miles), wrested from Denmark by Prussia and Austria in the war of 1864 and annexed by Prussia in 1866, was one of the stakes of diplomacy at the Peace Conference of 1919. Despite the programme of Germanization which Prussian officialdom had energetically pushed, about one-third of its 474,355 inhabitants at the outbreak of the War still spoke Danish. However, resistance to German rule in the period before and during the War had hardly been of an aggressive character. Schleswigers fought in the German army; Denmark was reluctant to estrange her powerful neighbor to the south by requests for territorial readjustment But the defeat of Germany and the triumph of the new democratic principles at once changed the complexion of affairs. The German government, anticipating a Danish appeal to the doctrine of self-determination, offered a separate arrangement for North Schleswig But Denmark procrastinated, the general dread of a resurrected Germany, together with the divided councils at home, standing in the way of a clear-cut pronouncement of aims. Finally, on Feb. 21, 1919, the Danish government placed the question of Schleswig before the Peace Conference. In the draft treaty submitted to the Germans in May, provision was made for the taking of a plebiscite in three zones, the third of which extended as far south as the Eider and the Schlei and was peopled largely by Germans whose social and cultural ties were clearly with the south While the Germans naturally objected to the inclusion of this southern region in the plebiscite area, it was the weight of the arguments of the Danish Radical party that succeeded in eliminating the third zone from the final treaty. Danes pointed out that the Germans in this district might be favorably disposed toward union with Denmark for economic reasons, viz., to escape heavy war taxes and the share of reparations, and that such a move would leave Denmark with a new irredentism Articles 109–14 therefore mapped out two plebiscite zones: the northern running south of Tönder but north of Flensburg, and the southern taking in the area about Flensburg. Voting in the first zone on Feb 10, 1920, gave a clear-cut majority for the Danes, 75,431 ballots being cast for Denmark and 25,329 for Germany. Tönder, in particular, being the centre of a Frisian population, gave a majority for Germany. Voting in the second zone took place

on Mar. 14, 1920. Flensburg, (population 63,000) the chief point of contention, was the scene of frequent clashes between the inhabitants and the French troops of occupation, and there were other disturbances. The final returns showed that 51,820 votes had been cast for Germany and only 12,793 for Denmark Flensburg went German by three to one. In June, 1920, the Council of Ambassadors fixed the boundary between Denmark and Germany and details were settled in the next month by treaty between the two countries. Into North Schleswig (Danish, Slesvig) the Danish currency was immediately introduced, and work was begun on the reconstruction of highways and railroads. Questions of the rehabilitation of war veterans, the protection of German minorities (of whom there were 25,000 in the province), frontier arrangements were amicably settled by treaty with Germany in 1922 Denmark assumed North Schleswig's share of the German reparation debt and under the Peace Treaty was obliged to pay 65,000,000 gold marks ($15,500,000) to the reparation account for the properties of the Prussian state which had passed into her control. A loan floated in the United States made the payment immediately possible. Danish Slesvig has an area of 1538 square miles and a population (census of 1921) of 163,622. By its acquisition Denmark's area was increased by about 10 per cent and its population by 5 per cent. A certain amount of German sentiment in the region was reflected in the fact that in the elections of 1920 and 1924 a German was returned to the Danish Folketing from Slesvig.

SCHMIDT, OTTO ERNST (pseudonym, OTTO ERNST) (1862–). A German Author (see VOL. XX). He wrote novels, plays and essays, of which the later ones include: *Nietzsche, der Falsche Prophet* (1914); *Gewittersegen* (1915); *Semper der Mann*, a novel which continues the story of his hero, *Semper der Jungling; Das Gluck ist immer da* (1916); *August Gutbier*, a satirical novel (1917); *Wer tötet Seine Mutter?* (1918); *Mann der Arbeit, Aufgewacht!* (1918); *Friede-Freude* (1920).

SCHMITT, FLORENT (1870–). A French composer, born at Blâmont, France. He began his musical studies at the Conservatory in Nancy, and in 1889–96 was at the Paris Conservatory, a pupil of Dubois, Lavignac, Fauré and Massenet. In 1897, he won the second Prix de Rome, and in 1900 the first prize. From 1906 to 1921 he lived in Paris, and devoted his entire time to composition. In 1921, he became director of the Conservatory at Lyons Although one of the foremost of impressionist composers, he does not sacrifice definite formal structure to mere atmosphere He wrote an opera, *Antony et Cléopâtre* (Paris, 1920); three ballets, *La Tragédie de Salomé* (Paris, 1907), *Ourvaçi* (unproduced), and *La Petite Elfe Ferme l'Œil* (Paris, 1922); the symphonic poems *Le Palais Hanté, Sélamik* (for military band), *Combat de Raksasas et Délivrance de Sita* (manuscript lost in the Paris flood of 1910), and *Rêves; for orchestra, En Eté, Reflets d'Allemagne, Pupazzi*, and *Rapsodie Viennoise;* vocal with orchestra, *Sémiramis* (lyric scene), *Psalm 46, Chansons à Quatres Voix, Pendant la Tempête, Danse des Devadasis;* a considerable amount of chamber music; and fine works for piano (solo, four hands, and two pianos).

SCHNABEL, ARTUR (1882–). An Austrian pianist, born at Lipnik, Carinthia. After receiving his first instruction from H. Schmitt he studied with Leschetizky in Vienna (1888–97). After that time he made constant tours, chiefly of Austria and Germany. He visited the United States for the first time in 1921. In 1912, he made his home in Berlin, where he formed a trio with A. Wittenberg (violin) and A. Hekking ('cello), and also appeared frequently as assisting artist with other chamber-music organizations. His joint recitals with Karl Flesch have for years been among the notable events of the Berlin musical season. As an eloquent interpreter of the classic and romantic masters he is unsurpassed, while as a composer, beginning as a mild impressionist, he gradually drifted toward extreme futurism. In his latest piano pieces, written after the War, he discards tonality, key-signatures, time-signatures and bar-lines.

SCHNEIDER, ALBERT (1863–). An American bacteriologist and pharmacologist, born at Granville, Ill. Having graduated in medicine at the College of Physicians and Surgeons, Chicago, in 1887, he settled in California and in 1903 began to teach bacteriology, pharmacognosy and therapeutics in the university of that State, resigning in 1919 to assume the professorship of pharmacognosy in the College of Pharmacy at the University of Nebraska. While in California he also took charge of the experimental station of the Spreckles Sugar Company (1906–07); was at the head of the department of pharmacognosy of the United States Department of Agriculture (1909–15) and was microanalyst of the State food and drug laboratory (1915–19). His chief publications are: *Pharmaceutical Bacteriology* (1912); *Pharmacal Plants and Their Culture* (1912); *Microbiology and Microanalysis of Foods* (1920); *Microanalysis of Powdered Vegetable Drugs* (1921).

SCHNEIDER, EDWARD CHRISTIAN (1874–). An American physiologist born at Wapello, Iowa. He was educated at Tabor College (B.S., 1897) and at Yale (Ph.D., 1901). He was instructor in chemistry at Tabor (1897–99); professor of biology and physical chemistry (1901–03), and professor of biology (1903–19) at Colorado College; and professor of biology (1919–) at Wesleyan University. He was physiologist in the medical research laboratory at Mitchel Field Air Service (1919–). Professor Schneider did important work on the influence of high altitudes on man in connection with the aviation service.

SCHNITZLER, ARTHUR (1862–). An Austrian dramatist (see VOL. XX). During the War and after it, many of his plays were translated into English and published in the United States, where they aroused much interest. *The Lonely Way*, translated in 1915, was highly considered. Other works made available to English readers were: *The Hour of Recognition, a Comedy of Words* (1916); *Casanova's Homecoming* (1922); *Gallant Cassian*, (a puppet play 1922); *The Shepherd's Pipe, and Other Plays* (1922); *The Vast Domain* (1922); *Living Hours* (1923).

SCHOFIELD, WALTER ELMER (1867–). An American painter (see VOL. XX). He received the Temple gold medal of the Pennsylvania Academy of Fine Arts in 1914, the Altman prize of $1000 from the National Academy of Design in 1920, and the Mrs. Keith Spalding

prize of $1000 in 1921. He enlisted in the British army in 1915, became captain of artillery, and saw active service in France.

SCHOOLS OF AGRICULTURE. See AGRICULTURAL EDUCATION.

SCHREINER, GEORGE ABEL (1875–). An American author, born in Germany. He served in the Boer War on the side of the Boers, came to the United States in 1900, and was naturalized six years later. He was managing editor of the San Antonio (Texas) *Light-Gazette* in 1912–13 and acted as war correspondent for the Associated Press in many countries. His writings include: *The Iron Ration* (1918); *La Détresse Allemande* (1918); *From Berlin to Bagdad* (1918); *The Craft Sinister* (1920); *Entente Diplomacy and the World*, with B de Siebert (1921); *How America Decided the World War*, from the MS. of General von Falkenhayn (1922); *International Communication—Its Means* (1924).

SCHUCHARDT, HUGO (1842–). A German philologist and university professor (see VOL. XX). His recent works are: *Aus dem Herzen eines Romanisten* (1915); *Berberische Hiatusstilgung* (1916); *Zu der Romanischen Benennung der Milz* (1917); *Sprachverwandtschaft* (1917); *Die Romanischen Lehnworter im Berberischen* (1918); *Sprachursprung* (1919–20); *Sprachenbrewer* (1922).

SCHÜCK, JOHAN HENRIK EMIL (1855–). A Swedish historian (see VOL. XX). He published: *Engelbrekt* (1916); *Shakspeare och Hans Tid* (1916); *Fran det Forna Upsala* (1917); *Messenius* (1920); *Ut Axel Reuterholms Dagbok* (1921).

SCHUMACHER, HERMANN A(MANDUS) (1868–). A German economist and writer on the science of government (see VOL XX). His works after 1914 include: *Der Panama Kanal und Seine Bedeutung* (1914); *Die Stellung der Deutschen Seeschiffahrt in Weltverkehr* (1914); *Deutschlands Volksernahrung und Volksernahrungspolitik im Kriege* (1915); *Deutschlands Stellung in der Weltwirtschaft* (1915); *Meistbegunstigung und Zollunterscheidung* (1916); *Antwerpens Weltstellung und Seine Bedeutung fur das Deutsche Wirtschaftsleben; Belgiens Stellung in der Weltwirtschaft* (1916); *Der Deutsche und Belgische Weltbewerb und Seine Regelung* (1916); *Deutschland und Englands Finanzielle Kraft* (1917); *Gegenwartsfragen des Sozialismus* (1920).

SCHURIG, ARTUR (1870–). A German writer and critic. He was born at Dresden and studied at the universities of Leipzig and Berlin. He is the author of: *Wolfgang Amadeus Mozart* (1913); *Das Leben eines Sonderlings*, a life of Beyle-Standhal (1921); *Konstanze Mozart* (1922); *Franzisco Pizarro* (1922); and two volumes of essays, *Anti-Tagore* (1921), and *Katechismus der Lebenskunst* (1922). He also wrote two novels, *Seltsame Liebesleute* (1913), and *Gottfried Buttervogel* (1923), and translated and edited works by Beyle, Flaubert, Julie de l'Espinasse, J. G. Prod'homme, Balzac, Taine, and others.

SCHWAB, CHARLES M. (1862–). An American capitalist (see VOL. XX). At the urgent request of President Wilson in 1918, he put all his great private interest aside and became director general of the Emergency Fleet Corporation, created for the purpose of producing sufficient ships to transport American troops to France. His energy and qualities of leadership cleared away difficulties and stimulated work so that all records were broken and the most hopeful estimates surpassed.

SCIENCE, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF. An organization founded in 1848 and incorporated in 1874. Connected with it are 81 officially associated societies, of which 49 are affiliated and have representation in the Association council. Twenty-seven scientific societies became affiliated in the period from 1914 to 1924 Besides the affiliated national societies, 12 State academies of science became affiliated. The membership of the Association itself increased from some 8300 in 1914 to approximately 13,000 in 1924. The registered attendance at the annual meetings was between 1800 and 2400. Besides the annual winter meetings, summer meetings were held at San Francisco, Salt Lake City, and Los Angeles. In the decade after 1914 the Association was much strengthened by the organization of the Pacific Division and the Southwestern Division, which act autonomously and hold summer meetings in their respective regions. The permanent funds of the Association increased, roundly, from $110,000 in 1916 to $132,000 in 1924. The weekly journal continued to be the official organ of the Association. A volume of *Summarized Proceedings*, including a directory of members, was published in 1915 and another in 1921; the next was to appear in 1925. The committee of 100 on scientific research, organized early in 1914, was the beginning of a nation-wide endeavor to accelerate systematic research A joint committee on conservation, organized early in 1921, was made up of three committees representing the United States National Academy of Sciences, the United States National Research Council, and the American Association. It aims to study the problem of conservation in a broad way and to aid in bringing the subject properly before the public of the United States, Canada, and other countries. The Association coöperated with the United States National Academy of Sciences and the United States National Research Council in the lately founded Science Service, whose aim was to disseminate truthful and at the same time readable information about scientific subjects President in 1924, J. McKeen Cattell, editor of *Science*. The Association published resolutions favoring the general adoption of the metric system of weights and measures and clearly stating the impregnable position of the scientific theory of evolution.

SCIENCES, NATIONAL ACADEMY OF. A body of American scientists, incorporated in 1863 for the purpose of investigating, examining, experimenting, and reporting on any subject or art, when called on by any department of the government. The activities of the Academy during the decade 1914–24 were varied and important. In 1916, as a result of a movement to mobilize the nation's science for industrial progress and military efficiency, the National Research Council was established, with John J. Carty as chairman. Dr. W. H. Welsh and G. E. Hale investigated in England the effect of the War on scientific research and industrial progress. During 1916 the Academy made an investigation of the Panama Canal slides. At the annual meeting of the Academy held in Philadelphia in 1917, Dr. Hale delivered an address on the work of the National Research Council. The meeting in 1918 was held at

Johns Hopkins University. The matters discussed, chiefly technical, related to chemistry, astronomy, medicine, and other sciences. The autumn meeting of 1919 was held at Yale University. Addresses were made by W. M. Davis on four cliff islands in the coral seas; C B Davenport and A. J. Love, on defects found in drafted men; and John M. Clarke, on some restorations of distinct vertebrates. There were also discussions of subjects relating to geography, chemistry, astronomy, and physics At the meeting held in Washington in 1920, interesting addresses on important subjects were delivered by A. A. Michelson, C. B. Davenport, F. V. Coville, L. J. Briggs, and others In 1921 the annual meeting was held in Washington. There was again discussion of important phases of science, including mathematics, physics, astronomy, medicine, and geology. An interesting paper was read by Maude Slye on the influence of heredity on the incidence of cancer. At the meeting in 1922, held in Washington, important papers included one by H. F. Osborne, entitled "Recent Discoveries on the Antiquity of Man," and one by J. S. Ames, "Recent Progress in Aeronautics." In 1922 a building for the National Academy and the National Research Council was under construction. This was made possible by a gift of $5,000,000 from the Carnegie Corporation and contributions from friends of the Academy and Council. The autumn meeting of 1923 was held at Cornell University. Many papers embracing a variety of subjects in the scientific field were read. The Academy awards several prizes and medals for eminent contributions to science, and grants in aid of researches are made from the income from trust funds administered by the Academy. Its publications include *Annual Reports*, *Memoirs*, and *Proceedings*. Additional publications are issued by the Research Council in its bulletin and its reprint and circular series. In 1923 Charles D. Walcott was succeeded as president by A. A. Michelson of the University of Chicago.

SCOTLAND. See GREAT BRITAIN.

SCOTT, AUSTIN WAKESMAN (1884–). An American lawyer and educator, born at New Brunswick, N. J. He graduated from Rutgers College in 1903 and from the Harvard Law School in 1909. He was successively instructor, assistant professor and professor of law at the Harvard Law School, occupying the latter position from 1914 He edited several books on legal subjects and was the author of *Handbook of Military Law.*

SCOTT, CYRIL MEIR (1879–). An English composer, born at Oxton, Cheshire. Having devoted himself chiefly to the study of the piano, he entered the Hoch Conservatory in Frankfort in 1896, and studied composition under I. Knorr. After 1900, he lived at Liverpool, making frequent pianistic tours. In 1920–21, he made a tour of the United States. As a composer he is recognized as the foremost of the English impressionists. So completely did he absorb the spirit of Debussy's art that his best works might easily pass as productions of the French composer His works comprise: a symphony; four overtures, *Christmas, Princesse Maleine, Aglavaine et Sélysette,* and *Pelléas et Mélisande;* two rhapsodies; *Aubade; Arabesque;* three *Dances;* a piano concerto; *La Belle Dame sans Merci,* for soprano and baritone with orchestra; *Helen of Kirkconnel,* for baritone and orchestra; *Nativity Hymn,* for chorus and orchestra; a piano sextet, a piano quintet, three string quartets and a violin sonata; numerous pieces for piano, and songs An opera, *The Alchemist,* had not yet been performed in 1924. He is the author of *The Philosophy of Modernism* (1917). Consult A. E. Hull, *Cyril Scott: Composer, Poet and Philosopher* (London, 1918; 2d ed, 1921).

SCOTT, JAMES BROWN (1866–). An American authority on international law (see VOL. XX). He was special adviser of the Department of State, and chairman of the Joint State and Neutrality Board (1914–17), and technical delegate to the Paris Peace Conference (1919) In 1915, he became president of the American Institute of International Law, and in 1910, trustee and secretary of the Carnegie Endowment for International Peace. His later books include *An International Court of Justice* (1916); *Peace Through Justice* (1917); *A Survey of International Relations between the United States and Germany, Aug. 1, 1914–Apr. 6, 1917* (1918); *James Madison's Notes on Debates in the Federal Convention of 1777 and Their Relation to a More Perfect Society of Nations*

SCOTT, LEROY (1875–). An American author, born at Fairmount, Ind, and educated at Indiana University On graduation he engaged in newspaper work (1897–1900) and later was assistant editor of the *Woman's Home Companion* (1900–01). During 1902-03 he was assistant headworker of the University Settlement in New York City and afterward devoted his whole time to writing His books include: *The Walking Delegate* (1905); *To Him That Hath* (1907); *Counsel for the Defense* (1912); *No 13 Washington Square* (1914; dramatized, 1915); *Partners of the Night* (1916); *Mary Regan* (1918); *A Daughter of Two Worlds* (1919); *Children of the Whirlwind* (1921); *Cordelia the Magnificent* (1923)

SCOTT, WALTER DILL (1869–). An American university president and psychologist, born at Cooksville, Ill., and educated at Northwestern University and at McCormick Theological Seminary. He began his career as associate professor of psychology and education at Northwestern University in 1901 and became president of that institution in 1920 He was director of the Bureau of Salesmanship Research of the Carnegie Institute of Technology during 1916 and 1917 and has been president of the Scott Company, consultants and engineers in industrial personnel, since 1919. In 1917 he was appointed director of the committee on classification of personnel in the United States Army, and in 1918 he was made colonel. For his personnel classification work he was given the Distinguished Service Medal He wrote. *Die Psychologie der Triebe* (1900); *The Theory of Advertising* (1903); *The Psychology of Public Speaking* (1907); *The Psychology of Advertising* (1908); *Influencing Men in Business* (1911); *Increasing Human Efficiency* (1911); *The Psychology of Advertising in Theory and Practice* (1921); *Science and Common Sense in Working with Men* (1921); *Personnel Management* (1923).

SCOTTI, ANTONIO (1866–). An Italian dramatic basso (see VOL. XX). In the spring of 1921, after the close of the regular season at the Metropolitan Opera House, he organized the Scotti Grand Opera Company, recruited

largely from the Metropolitan artists, which made a very successful tour of the eastern cities. This tour later became an annual event.

SCRANTON. A mining and manufacturing city of Pennsylvania The population rose from 129,867 in 1910 to 137,783 in 1920; to 140,636, by estimate of the Bureau of the Census, for 1923; and by city estimate to 151,000 in 1924. Weston Field, a community building and public playground, was constructed. A new junior high school was erected, as well as several industrial and commercial buildings After the collapse of certain mine galleries under the city, causing surface subsidence, the operating companies took greater precautions in their methods and assumed responsibility for the damage done to surface property.

SCULPTURE. The effect of the War upon sculpture was at first disastrous. In practically all European countries production gradually and then almost entirely ceased. Soon after the close of the War a revival came. The call for war memorials was extensive, and sculptors were as much in demand as ever. The tendencies remained about the same as just before and during the first years of the War.

France. On Nov. 17, 1917, Rodin, born 1840, the greatest of French sculptors, died His art was the culmination of the naturalism of the nineteenth century, and it was chiefly he who developed the highly pictorial character of most contemporary art. His breaking up of the surfaces into bosses and hollows to attain the subtle modeling and effects of light and shadow in which he so greatly excelled and his rendering of instantaneous movement realized in sculpture a measure of representation thitherto confined to painting. The impressionism of his later period, neglecting more and more the nonsignificant parts and emphasizing only the characteristic and essential, paved the way for the sketchy character of most modern work and finally for the vagaries of postimpressionism. The dominating feature in the later development of French and indeed of European sculpture was undoubtedly the influence of Rodin, which may be compared with that of Michelangelo on Italian sculpture of the sixteenth century, when as in the later time it was easier for less gifted artists to copy the master's weaknesses than his strength. The peculiarities which in Rodin's work were balanced by marvelous modeling and profound depth of sentiment often became mannerisms in the works of his less gifted followers. This influence was in part disastrous, aided as it was by other disintegrating tendencies in French art Even the older men, Rodin's immediate contemporaries, lost their bearings. The public monuments of France just before the War were for the most part tawdry, in poor taste, and unmonumental. This was apparent in the later work of such able artists as Mercié, Fremiet, Barrias and others, and to a less extent in those of Saint Marceaux and Falguière The next generation followed for the most part in these footsteps. The later work of men like Denys Puech, François Larche, Verlet, Villeneuve, Charpentier, and others possessed the same false note.

Salvation came from a group of younger men, also under the influence of Rodin, who, following Bartholomé's advice, carved great simple figures in native limestone, as the mediæval masters did. One of the three foremost of these, Aristide Maliol (1861–), an artist of elemental power and primitive methods, strives for sculptural bulk. Émile Bourdelle (1861–) was Rodin's direct and most powerful successor, whose mighty portrait heads and dramatic reliefs well emulate his master's. Henri Bouchard (1875–), a strong and highly characteristic master, was a versatile and well-balanced artist, and perhaps the most important of the three Among sculptors practicing the more finished modeling along traditional lines and whose works are of real artistic worth were the clever François Sicard, Quilivic for Breton subjects, Constant Roux, Cordonnier, Jules Desbois, Gustave Michel, Jean Boucher, and later, Marcel Jacques, Maurice Faure, and Jeanne Hanin. The War brought the usual crop of designs for military memorials, mostly bad.

Mention may be made here of postimpressionism, the reaction against the unbridled naturalism and cleverness of much official French sculpture. For although its chief exponents were not native Frenchmen, yet they studied in Paris, and it was there that they found their principal support. Postimpressionism endeavors to represent the human figure in a purely abstract way, with little or no reference to actuality The method consists in the elimination of almost all modeling except of the parts chosen for characterization, which are exaggerated out of all semblance to nature. This is exemplified in the strange portraits, usually expressing a highly rarefied type of humanity, by Constantin Brancusi, a Rumanian. Other well-known representatives were Gautier-Brzeska (1891–1915), a young man killed in the trenches during the War, who belonged to the vorticists, and Aleksandr Archipenko, the most important of the group. The latter simplifies the parts of the human body into geometrical shapes and exaggerates its curves in taking various postures, thus achieving sculptural bulk. The little figures of Henri Matisse are as curious as his paintings. Umberto Boccioni, an Italian futurist, tacked all kinds of actual objects such as glass, wood, cardboard, cloth, and electric lights, to the sculpture represented; in this he followed the custom of futurist painting. See PAINTING.

Germany. From the early years of the twentieth century a veritable renaissance of sculpture took place in Germany and Austria. Nowhere else was the change as marked. The outworn realism and romanticism of the late nineteenth and early twentieth centuries were replaced by a new and more vital naturalism, of a strikingly simplified and essentially decorative character. The new sculpture was conceived as a part of the building or monument to which it belonged, subordinated to the *Massgefuhl*, i.e. the feeling for the mass of the whole. It combines technical ability of a high order in modeling, carving, and casting with a mastery of the most varied materials of sculpture. It seeks to express character, and its chief attribute is power, even to the point of brutality This new German style found its most striking expression in a series of national monuments, such as the colossal statue of Bismarck at Hamburg by Hugo Lederer, conceived in the style of the mediæval effigies of Roland, and the Völkerschaft Monument, commemorating the battle of Leipzig, by Bruno Schmitz, the largest military monument in the world. The sculptures of the latter, by Franz Metzner, are in a class by themselves, colossal, harmonious, and mysterious. The clever adaptation of sculpture to

architectural effects is seen also in many recent buildings. In the Haus Rheingold, a Berlin restaurant, Metzner employed the human body as a purely decorative form with astounding effect. Other examples of subordination and simplification are the reliefs of the Bürgertheater in Vienna by Luksch-Makowska, and especially the sculptures of the proscenium of the Marble House Theatre in Berlin, by G. S. Sieburg, in which simplification is pushed to the utmost limit.

The most influential and widely imitated figure in the later German sculpture was Franz Metzner (1872–1918), whose art, often grotesque and enigmatic, shows a profound feeling for the mass and is masterful in technique. The best qualities of this modern German sculpture, power, plasticity, and ability, are exemplified in such works of Hugo Lederer (1871–) as the Krupp memorial at Essen. Of powerful monumental quality is also the work of Benno Elkan (1877–), in his fine funerary sculpture, like "The Stone of Lamentation" at Wickrath in the Rhine Province, his lifelike busts, and medals. Anton Hanak (1875–) of Vienna is primarily a sculptor in marble, whose inspiration is Michelangelo and the Greeks. The stone and marble nudes of Hermann Haller, Hubert Kowarik, Hans Damman, and Karl Stemolak are Hellenic in simplification and of fine sculptural quality. A master marble cutter was Theodor Georgii (1883–), whose work is carved directly out of the stone. He was also a leader in animal sculpture, in which connection August Gaul (1868–) especially and Fritz Behn (1878–) should be mentioned. Other important carvers of stone and marble among the younger men were Georg Kolbe, Arthur Lange, Ernst Seger, Joseph Limburg, and Adolf Brütt.

The decorative talent of the contemporary German school was especially evinced in the treatment of most diverse materials, as in Joseph Wackerle's archaistic figures of travertine. Audacious and powerful experiments in tinted sculpture were made by Benno Elkan and others. Charming if startlingly modern effects were attained in porcelain by Theodor Eichler and Bernhard Hötger of Darmstadt. Woodcarving was practiced more extensively and enthusiastically in Germany than elsewhere, by Hermann Haller in Berlin, Richard Langer in Munich, and especially Franz Barwig in Vienna.

Other European Countries. Among sculptors who died in Great Britain during the decade 1914–24 was Sir George Frampton (1860–1923), known especially for his polychrome sculptures. His monument to Edith Cavell, erected in St. Martin's Church, Trafalgar Square, London, in 1920, shows his conversion to Greek archaism, a very startling change. This is a sign of the diminishing vogue of the union of the arts and crafts movement with sculpture, so successfully practiced by Alfred Gilbert (1854–) and his followers. The list of dead includes also Thomas Brock (1847–1922) and Robert Colson (1867–1921). The outstanding feature of British sculpture of the day was the prevalence of the French influence, modified by the more ascetic requirements of British taste. Among the older men Hamo Thornycroft (1850–) and Alfred Drury (1859–), the foremost representative of the French influence in England, continued an important activity. Of great imaginative power and originality is the work of Bertram MacKennal (1863–), an Australian trained in Paris, although his later memorials showed increased conformity to prevailing British tastes. His equestrian statue of Edward VII in Trafalgar Square was unveiled in 1921. Gilbert Bayes (1871—) was known chiefly for the use of the horse as a motif and for his interesting accessories. Among other men whose work is noteworthy were S. Nicholas Babb (1874–), Albert Toft, Ernest Gillick, Benjamin Clemens; Richard Garbe, whose art is characterized by a certain brutal strength; Havard Thomas, and Derwent Wood. Mention should also be made of the highly characteristic and very modernistic productions of Jacob Epstein (1880–), who was born in New York and received his principal artistic education in Paris. His "Christ" in particular provoked much discussion.

In Belgium, the glorification of labor, so ably begun by Meunier, was notably continued by J. van Biesbroeck, of Ghent. The more conservative tendencies were represented in the work of Victor Rousseau (1865–), whose bronze group entitled "Gratitude," erected in Trafalgar Square in London, was presented by Belgium to Great Britain in 1920. The most startingly original of Belgian sculptors of the period was Georges Minne (1867—), likewise of Ghent, whose spare and highly stylized figures are of great power.

Scandinavian art of the period was very modern and showed the French influence, modified by native requirements. The lifelike and rather unfinished works of Carl L. Eldh (1873–) are impressionistic in character. Carl Milles (1875–) shows great versatility of subject, ranging from dancing girls to prehistoric monsters; he is always monumental in his presentation. Mention should also be made of the lively imaginative Icelander, Einar Jonsson.

Russian sculpture was cosmopolitan in character, as the artists were trained and lived largely abroad, especially after the social revolution. The art of Prince Paul Troubetzkoy (1866–), born in Italy, self-taught, and much influenced by Tolstoy, is clever and impressionistic in character. Naoum Aronson, who resided in Paris, was a striking individualist, excelling especially in his interpretation of children. Modernism had numerous representatives, chief among them Archipenko.

The Italians are the best stone cutters in the world, and their sculpture is characterized by a manual dexterity and florid ornament which proved itself a bane. Biondi (1885–1917) was known for his large groups carved more or less disconnectedly, and often revoltingly naturalistic, with the exception of his latest production, "Les Récluses Misérables," which, strange to say, was highly spiritualized and well composed. Vincenzo Gemito (1852–) modeled charming bronze genre subjects, usually representing Neapolitan urchins. Leonardo Bistolfi (1859–) of Turin created some work of true monumental character, like his fine "Offering" on the Victor Emmanuel monument at Rome. In 1915 a superb Garibaldi monument by Eugenio Baroni was unveiled near Genoa.

Spanish sculpture also suffered from parade of technique and too many accessories. The foremost sculptor at the close of the period was José Clara (1878–), whose art is always

personal and interesting, sometimes even titanic. More or less directly connected with the development in Germany and Austria is the art of the non-German peoples who once formed a part of Austria-Hungary. Their art, like the Germans', emphasizes the mass and strives after power even to brutality. Among the prominent figures were Nicholas Ligeti and Geza Maroti of Budapest and Jan Stursa of Prague, known especially for his subtly modeled figures of girls. Foremost of all was Ivan Meštrović (1883–), born in Dalmatia, in 1924 the national sculptor of Jugo-Slavia. He studied at Vienna under Franz Metzner, whose art his own most resembles, and was also for a time in Paris, where he was influenced by Rodin, who pronounced him "the most remarkable of living sculptors." His powerful and dramatic art shows a certain influence of the archaic Greek, and in religious subjects he goes back to Byzantine traditions.

The United States. In no other country was there such an increase in the output of sculpture during the twentieth century and especially during the decade 1914–24 as in the United States. So great was this that the volume of sculpture produced after 1900 more than equaled all that had been done before that time. One of the reasons for the increased output was the wide use of architectural sculpture, especially on public buildings, and the willingness of important sculptors to devote themselves to such work; another was the great demand for public monuments throughout the country; a third was the demand for garden sculpture, especially for fountains in public parks and private grounds. Owing to the distance of America from the scene of conflict and to its late entrance into the War, there was no such cessation of artistic production there during the War as took place in Europe.

As compared with the development in Europe, American sculpture took a middle course, avoiding conservative and radical extremes, sometimes indeed a little restrained, but escaping the extravagances of postimpressionism. The chief centre of production continued to be New York and its vicinity, where nine-tenths of American artists live and labor. They come, however, from the length and breadth of the land, by far the greater number from west of the Alleghanies, and many from the Far West.

During the decade 1914–24 the United States lost several important sculptors. Foremost among them was Karl Bitter (1867–1915), killed by accident in his prime. His latest works, such as the granite pediment of the Wisconsin State capitol and the Lowry memorial of Indianapolis, show constant development of a decorative sense and mastery of material. A fitting termination for the activity of Henry M. Shrady (1871–1922) was the national U. S. Grant memorial at Washington, D. C., especially the colossal bronze equestrian statue of Grant which ranks among the best of the day. Bela L. Pratt (1864–1917), active as a teacher in Boston, is known for his youthful, girlish nudes; Solon A. Borglum (1868–1922), for cowboy and Indian subjects and many monuments. Among others were John J. Boyle (1852–1917), sculptor of red men; Edith Woodman Burroughs (1871–1918), famed for girlish figures and characteristic portrait busts; and Charles Cary Rumsey (1879–1922), known especially for his horses.

Among the older men, the extensive production of Daniel Chester French (1850–), dean of American sculptors, combined with his customary good taste and pure form a distinct increase in power, as may be seen in the lovely nude "Memory" in the Metropolitan Museum of New York City, the colossal seated Lincoln for the national Lincoln memorial (1919), and the Dupont Fountain (1922), both in Washington, D. C. Besides his monumental sculpture, Herbert Adams (1858–) continued the production of sensitively tinted heads of young women. Charles H. Niehaus (1853–), "indefatigable builder of monuments," had a number of later works to his credit, like the Francis Scott Key monument at Baltimore (1922), and so had J. Massey Rind (1860–), besides a vast quantity of decorative sculpture.

The later works of Frederic MacMonnies (1863–) continued his novel and exotic ideas, as witness the Denver "Pioneer" fountain and the Princeton battle monument. George Gray Barnard's (1863–) profound, symbolic work is worthily expressed in some of his recent statues, like "Woman" (Metropolitan Museum, New York City). His powerfully realistic and magnificently characterized bronze Lincoln (Cincinnati, Ohio, and Manchester, England) caused more discussion than perhaps any other American statue. Paul Bartlett's (1865–) thoughtful and skillful technic is revealed in the grandiose pediment of the House of Representatives in Washington and his delicate architectural figures on the New York Public Library. Gutzon Borglum (1876–) was in 1924 engaged on a group of 42 heroic figures in bronze for Newark, N. J., and on a colossal relief, 700 feet by 100 feet, involving several hundred figures, carved in the face of Stone Mountain, near Atlanta, Ga. The latter was intended as a memorial to the Confederate Army and when completed was to be the most colossal work of sculpture ever attempted.

Among other sculptors producing important public monuments were Hermon A. MacNeil (1866–); Albert Jaegers (1868–), who did the fine "Pioneer" monument at Germantown, Pa.; Edmond T. Quinn (1868–), whose work is tasteful and conscientious; Alexander S. Calder (1870–); Adolph A. Weinman (1870–); and Augustus Lukeman (1872–). The Piccirilli family is celebrated for skillful marble cutting. An important later work by Attilio Piccirilli (1866–) was one of the pediments of the Wisconsin State capitol at Madison, and by his brother Furio (1870–), a statue of Pierre Gautier de la Varenne, forming part of the decoration of the Parliament House at Winnipeg in Canada, which is entirely in his charge. Charles Grafly (1862–), the well-known teacher in Philadelphia, in the late years of the decade, devoted himself to portraiture, in which he was unsurpassed in American sculpture. Lorado Taft (1860–), dean of Chicago sculptors, in later years devoted himself to the creation of fountains, like the "Fountain of Time" in Chicago (1922). Cyrus Dallin of Boston (1861–) continued his distinctive work, the representation of the American Indian.

Among animal sculptors, Phinister Proctor (1862–) had begun to subordinate his animals to the human figure in a series of monuments. Edward C. Potter's latest works included the much discussed lions at the Public

Library in New York. Excellent indeed are the animal bronzes of F. C. R. Roth; Eli Harvy; Albert Laesle (1877–), who depicts in unique manner the humor of animal life; and Anna V. Hyatt (Mrs. Archer Huntingdon) (1876–). Her spirited equestrian Joan of Arc on Riverside Drive, New York City, was a stirring conception. The War offered fine opportunity for the medalists, chief of whom in the United States were John Flanagan (1865–), designer of the well-known Médaille de Verdun (1921), and Victor D. Brenner (1871–).

The sculpture of the men born after 1870 was full of promise for the future. Andrew O'Connor's (1874–) figures, like the "Soldier" of Worcester, Mass., and the Lincoln at Springfield, Ill., are virile in conception and well-modeled. The art of James Earle Fraser (1876–) is marked by skill and good taste, as in "The End of the Trail" (San Francisco), and his relief is wondrously delicate. Lee Lawrie (1877–), of German origin, was an architectural sculptor, as witness the figures of the reredos of St. Thomas's Church in New York City. Mahonri Young (1877–), well-known as a teacher, specialized in characteristic statuettes of laborers. Rudolf Evans (1878–) became famous as a carver of beautiful nudes through "The Golden Hour," in the Luxembourg, Paris, and Metropolitan Museum, New York City. Robert Aitkin (1878–) was a strong yet versatile artist, whose monuments, garden figures, busts, coins, and medals were widely known. Grace and charm are the marked characteristics of the carefully modeled work of Edward McCartan (1878–). The vivid portraits by Jo Davidson (1883–) of figures prominent during the War are powerful artistic as well as historic documents.

The American Academy at Rome had a marked influence on later American sculpture through the young men who enjoyed its four years' scholarships. The dominant note of their art is Greek archaism in all decorative and conventional features but less in figure modeling. The execution is on the whole more finished than that of the group which studied chiefly in Paris. Sherry Fry (1874–) combined the archaic note with careful and interesting modeling. John Gregory (1879–) is known for charming garden figures. The art of Chester Beach (1881–) reflects rather the Rodinesque than the archaic motive. It is clear, individualized, and of rugged quality. Likewise the art of Albin Polasek, an excellent portraitist, and in 1924 instructor in the Art Institute in Chicago, is also rather naturalistic than archaic. The chief representative of the latter-day classicism was Paul Manship (1885–), a master craftsman of archaic decoration, combined with skillful modeling of the nude. In Leo Friedlander's (1889–) work the archaic is united with a certain brutal power reminiscent of the modern German school.

A striking feature of the development of American sculpture during the period was the large number of distinguished women, greater than in any other country and larger than that of women painting in the United States. Although practicing all branches of sculpture, they excel especially in representing women and children, garden sculpture, and small bronzes. Janet Scudder (1873–) is known for her fountain figures; Bessie Potter Vonnoh (1872–), for simple domestic scenes invested with great charm; Abastenia Eberle (1878–), for plastic sketches of the humble life of a great city. Evelyn Beatrice Longman (1874–) has created a series of busts, bronze doors, and memorials; Laura Gardin Fraser (1889–), nudes and miniature reliefs; Anna V. Hyatt, animals; Malvina Hoffman (1887–), spirited figures and groups; Frances Grimes, graceful marble reliefs; Harriet W. Frishmuth (1880–), dramatic nudes. Mention should also be made of Gertrude Vanderbilt Whitney, whose sculpture, always original, became strongly personal.

Modernist tendencies found little echo in American sculpture. Their chief representative was Gaston Lachaise, a Frenchman, trained in the Beaux Arts, but whose sculpture was produced in New York.

Bibliography. The best comprehensive view of the development of the period is Lorado Taft's *Modern Tendencies in Sculpture* (Chicago, 1921). Other accounts are by C. R. Post, *A History of European and American Sculpture*, vol. ii (Cambridge, 1921); and Kineton Parkes, *Sculpture of To-Day* (London, 1921). For the United States, consult the supplementary chapter to Lorado Taft's *History of American Sculpture* (New York, 1923). See also Adeline Adams, *The Spirit of American Sculpture* (New York, 1923) and the current art magazines.

SCURVY. The ideal antiscorbutic diet was still undetermined in 1924. Originally the disease was attributed in part to the substitution of salted for fresh meat Experiments on animals have shown that although fresh meat contains antiscorbutic vitamine, it is insufficient to prevent the development of scurvy if the diet is otherwise free from the Vitamine C. There is evidence that to contain effective Vitamine C, the meat must be raw and quite freshly killed. Arctic explorers escape scurvy at times by subsisting on freshly killed game; fresh fish is devoid of this vitamine, and this is also true of the fat of meat Indians and Esquimaux appear to prefer fresh viscera to fresh muscle and always bargain for the former when dividing game with white men. It goes without saying that all preserved and tinned meat is unsuitable in an antiscorbutic dietary, and raw viscera are out of the question for white men. There was considerable propaganda for the purpose of prevailing on the white man to settle permanently within the Arctic Circle; this was based on the century-old misrepresentation concerning this climate. Steffansson has shown that the weather there can be matched in every way with that of certain portions of the northern United States. The degree of cold, amount of snow, and other seasonal drawbacks are not materially worse in the Arctic and are often better. A greater drawback might be scurvy due to the absence of fresh game and other foods containing the Vitamine C. To go through the winter free from scurvy there would have to be a plentiful supply of potatoes, apples, canned tomatoes, and fresh milk; dried and evaporated vegetables would not serve.

SEALS. See FISHERIES.

SEAMEN'S ACT, OF 1915. See SHIPPING.

SEAPLANE. See AËRONAUTICS; NAVIES, *United States*.

SEARES, FREDERICK HANLEY (1873–). An American astronomer, born at Cassopolis,



COURTESY OF BROWN-ROBERTSON CO., INC.

JAMES EARL FRAZER

"THE END OF THE TRAIL"

In the Golden Gate Park, San Francisco, California

Mich. He studied at the University of California and in Berlin and Paris. During 1901–09, he was professor of astronomy and director of the Laws Observatory at Missouri In 1909, he was called to the charge of the computing division and of the publications of the Mt. Wilson Observatory of the Carnegie Institution. Among the special investigations by which he advanced the knowledge of astronomy are studies on the theory of orbits and perturbations, distribution of stars, and the general magnetic field.

SEATTLE. The twentieth city in the United States and the largest north of San Francisco and west of Minneapolis. In 1923 Seattle ranked second to New York in the number of people entering the United States through it and was outranked only by New York and Boston in value of foreign imports The population increased from 237,976 in 1910 to 315,685 in 1920 and to 355,000 by local estimate for 1924. In 1919 Seattle purchased the street railway system on a $15,000,000 public utility bond issue; in 1924 it supplemented its municipal power plants by the first unit of the Skagit River power development The municipality also added some $5,000,000 to its investment in waterfront terminals at Smith Cove, including a municipal pier more than half a mile long, used for trans-Pacific shipping. A fireproof concrete municipal grain elevator was built At the close of the War a memorial civic centre was planned. Between 1909 and 1924 there was an increase of 163 per cent in the number of manufacturing establishments, 537 per cent in the number of employees, and 98 per cent in the value of products Bank clearings increased 251 per cent, from $90,093,365 in 1910 to $2,072,639,436 in 1920, deposits, 96 per cent, from $78,827,201 to $154,530,874, foreign imports, 1012 per cent, from $21,668,831 to $241,112,184, foreign exports, 1233 per cent, from $10,150,702 to $135,312,904; domestic imports, 375 per cent, from $28,143,402 to $133,823,985; and domestic exports, 115 per cent, from $36,128,105 to $77,774,124.

SECRET TREATIES. See WAR, DIPLOMACY OF THE

SECRETIONS, INTERNAL. Endocrinology made prodigious advances in the decade 1914–24, as shown by the formation of a national society for the study of internal secretions, the appearance of a quarterly magazine devoted to the subject, and the publication of an encyclopædic work on the endocrines edited by Dr. Barker of Johns Hopkins Naturally the subject of organotherapy belongs under this heading, including insulin and the sensational work in so-called rejuvenation done by Steinach and his followers, Voronoff and others. Dr Barker, in summing up endocrinology in the *Journal of the American Medical Association* (July 8, 1922), prefers the term incretion, signifying internal secretion, to endocrine substance, hormone, etc. Of great immediate interest is the possible difference between active principles found in glands and whole gland substance. The probabilities are that these organs, like certain plants, contain several active principles In addition to the clinical evidences of excess or diminution of production of certain incretions, the results of actual treatment and autopsies, attempts were made at pharmacologic tests in which certain alkaloidal drugs as well as the incretions themselves are injected into the organism for diagnostic purposes in order to determine whether there is a deficiency or superfluity of gland activity. One of the great advances of the decade was the isolation of thyroxin as the representative active principle of the thyroid gland by Kendall at the Mayo clinic. Removal or reduction in size of one suprarenal gland has been practiced many times in Germany in the hope of mitigating incessant convulsions in certain epileptics, since increased convulsibility was believed to be a result of excess of suprarenal tissue. While certain incretions are active in determining the stature, length of long bones, general outlines of the face, and other static peculiarities, others were believed to determine the rate of metabolism and incidentally the temperament of the individual.

Effects of Faulty Foods. This subject was studied by McCarrison of India with special reference to the presence or absence of vitamine It is evident that the phenomena seen in deficiency diseases are due largely to the effects produced on the endocrine glands. Other groups of symptoms were due to simple starvation, unbalanced diet, and excess of fat. It is remarkable that in prolonged fasting the suprarenal glands enlarge, although all other endocrine bodies undergo reduction in size The thyroid gland is reduced, to two-thirds its normal size, but the weight of the suprarenal may double. If the animals then receive plenty of food with exclusion of vitamine, the results show much similarity, although in some males the pituitary body enlarges as well as the suprarenals This group of symptoms is produced also by simple deprivation of vitamine B; absence of vitamines A and C is without these effects. If on the other hand plenty of vitamine is given without any protein in the food, there is reduction in size of some of the endocrines, but it is very slight in some of them; the pancreas is the chief sufferer. In this group as in the others, the suprarenals were notably enlarged. If the diet did not contain the normal calory requirement, analogous behavior was noted. The significance of the enlargement of the suprarenals does not mean any effort at compensation, for it has long been known that their secretion is deficient in fasting. Hence, practically all of the endocrine glands suffer through improper feeding of any kind. In overfeeding with fat, the thyroid enlarges and the suprarenals become smaller The thyroid is genuinely enlarged, much as in Graves's disease. McCarrison indeed terms the condition goitre and associates its cause in such cases with relative absence of iodine from the diet. In normal thyroid structure and function there is a balance between diet fat and iodine.

Gonads or Sexual Glands. The fact that castration of immature animals prevents the full development of secondary characters led to the general belief that the sexual glands are the sole seat of sex. The various operations for procuring so-called rejuvenation are based on this conviction. Many isolated facts antagonize this belief, and it became increasingly evident that sex differences extend throughout the entire organism. In other words, a woman is not a woman because of her ovaries but has ovaries because she is a woman. It is also possible to show that sex is a matter of degree or development rather than a basic antagonism. The substratum of the individual is believed to be female, with an evolutionary tendency to

maleness. The unfertilized ovum is all female, and fertilization is necessary for maleness to develop. Once maleness has developed it is stable and immutable, but femaleness is essentially transitory. After the termination of the breeding cycle, the female may take on a number of male secondary characters, although there are no male sexual glands to explain the phenomenon. Otherwise sexually entire individuals have been born without sexual glands, and castration even of the very young male animal sometimes fails to deprive it of maleness. Since the substratum is essentially female, there is originally but one type of gonad, the ovary. In physical hermaphrodites and, it is also claimed, in the psychical form or sexual invert, an apparent testicle may prove under the microscope to be a so-called ovotestis or ovary only partly differentiated into a testis. It is evident that the relative number of males and females in a community depends on the amount of development from ovary to testis. In some of the lower animals such as tadpoles it is possible to stimulate the development, so that instead of normal equality of numbers only male adults develop. Study of individuals often shows dissociation of secondary sexual characters; thus the plumage of certain birds is part male, part female In general, sex resides in the individual cell, in the chromosomes.

Relation of the Gonads to Sex. This question could be answered only imperfectly. In the latter years of the nineteenth century no one doubted that the kind of gonad determined the sex entirely, but in the interim there was a steady accumulation of evidence to the contrary, largely as the result of animal experiment. It was learned that in the absence of a functioning thyroid, sexual development is defective. In certain experiment animals it was shown that implantation of testes into castrated females changes them into males, but the converse is not true; implantation of ovaries into castrated males does not change them into females. The development of certain tumors in the region of the adrenal glands occurring in females will effect transformation into males, with certain physical limitations such as suprarenal virilism; and in these changes the ovaries play no part.

It is true, however, that grafting testicular substance into various types of animal and man will produce striking phenomena, as shown especially by the experiments of Steinach on rats. These researches were carried out for years on male and female, old and young, castrated and entire. It was noted that in addition to change in sex characters there was also an alteration in age characters. Thus it was apparently possible not only to alter the sex of an animal but to alter its age; in other words, to rejuvenate it. In order to understand the bearing of such experiments it is necessary to know much about ordinary breeding of strains of animals, including crossing and hybridism, and the natural history of intact and castrated animals of both sexes. It must be remembered that the animals lead artificial lives, are purposely bred for experiment, and so on. Thus Steinach's results were at one time disputed; breeders made the claim that his old senile rats who became young again were only sick rats who improved in health because of the favorable conditions secured by the experiments. Steinach seemed to have disproved this charge.

Division or Ligation of the Duct. Steinach, who at first advocated actual implantation of material from the sexual glands to produce the similitude of rejuvenation, later discovered in the course of experiment that simple division or ligation of the spermatic duct produced such stimulation of the interstitial portion of the testis as to produce the same therapeutic result as actual implantation. Owing to the difficulty of obtaining testicular material, this discovery was hailed as of major importance, for any surgeon could perform the operation at any place or time. The results of section of the duct appeared to be very unequal, striking in certain cases and negative in others. These discrepant effects were variously explained. The benefits in some cases supervened so rapidly that they were attributed to mental impression. Attention was also called to the fact that division of the duct as an incidental step in the operation of removing the hypertrophied prostate was practiced thousands of times without any evidence of rejuvenation, but the counterclaim was made that there was often more improvement in the general health after excision of the prostate than could be explained by mere removal of an obstruction; some very old men secured a new lease of life and usefulness.

The direct result of ligation or division of the duct is destructive; the sperm forms cells undergoing atrophy. This in turn is followed by an overgrowth of the connective tissue in which are imbedded the Leydig cells which supply the internal secretion of the male gonad. This state of affairs is not permanent, for the spermatic cells show some regeneration; at the same time the Leydig cells are reduced in number. The favorable results are more noticeable in premature senility, i.e. in men less old in years, than in men in the seventies and eighties. In the really old, the benefit, when present, is of the nature of a general tonic, while in the prematurely old there may be in addition improvement in defective sexual functions.

Implantation of Testicle. This operation did not originate with Steinach, for it was performed by Lespinasse and Lydston both of Chicago and independently of each other, on human beings and using human testicles. Others who followed them used the testicles of animals, including those of apes, rams, beeves, etc. This entire line of experiment is derived from the much older transplantation of ovaries, which has long been a recognized procedure, although largely limited to implantation of the woman's own ovaries after the operation of total removal of the uterus and appendages The object of such transplantation has nothing in common with rejuvenation or reinvigoration but is solely to protect the woman from the trying symptoms which follow castration. In implanting the testicle, the same idea has been entertained in cases of accidental castration; such cases are few in comparison with the opportunities which daily present themselves of premature old age, functional loss of virility, and general breakdown of health. The simplest and easiest method consists in implanting a small slice of beef's or ram's testicle under the skin of the abdomen. The testicles of men and apes have been used in a few cases Dr. Belfield summed up the subject of testicular implantation by stating that in the elderly the benefits, when apparent, are but shortlived. In young men who have had their gonads removed

by accident or surgery or who have lost them as a result of destructive disease, the good results are more in evidence and the period of recovery longer, although it lasts only some months. The operation may of course be repeated indefinitely. It is by no means certain that this improvement is specific in character. The work of Voronoff largely corroborated that of Steinach, although his experiments were conducted on goats and rams. Human experience is not recorded in his books. Steinach and his followers have reported many cases of gonad grafting in men and in women as well.

SECRIST, HORACE (1881–). An American economist, born at Farmington, Utah. He studied at the University of Wisconsin, where he took his Ph.D in 1911. In 1909, he became instructor of economics at Wisconsin, where in 1918 he became professor of economics and statistics. In 1909, he was expert special agent of the United States Census Bureau, and during 1911–12, statistician of the Wisconsin Industrial Commission, becoming also in 1914, United States Commissioner of Industrial Relations. During the War, he was the statistician of the tonnage section of the United States Shipping Board and later was supervising statistician of the United States Railroad Labor Board. In addition to many articles variously contributed, he is the author of *An Economical Analysis of the Constitutional Limitations on Public Indebtedness in the United States* (1914); *Readings and Problems on Statistical Methods* (1920); *Costs, Merchandising Practices, Advertising and Sales in the Retail Distribution of Clothing* (6 vols, 1921).

SEGUR, PIERRE M. H., MARQUIS DE (1853–1916). A French historian, born in Paris, and educated at the College of Stanislas. He entered the public service in 1876 as auditor to the privy council but after a short time relinquished that office to devote himself to the study of French history and literature. He became a member of the French Academy in 1907. His writings consist of studies of the seventeenth and eighteenth centuries, several histories covering the reign of Louis XVI, and various articles and discourses, including: *Gens d' Autrefois* (1903); *Esquisses et Récits* (1908); *Silhouettes Historiques* (1911); and *Parmi les Cyprès et les Lauriers* (1912).

SEIDEL, TOSCHA (1900–). A Russian violinist, born at Odessa. At the age of seven he began to study the violin under Max Fiedemann. From 1909 to 1911, he was a pupil of Alexander Fiedemann at Stern's Conservatory in Berlin, where Auer heard him and offered to teach him free of charge. In 1915, he made a most successful début at Christiania, and for the next three years appeared extensively throughout Scandinavia in recitals and with orchestra, and occasionally in joint recitals with Auer himself. In 1918, he made his American début at New York, and since then has made extensive tours of the country, meeting everywhere with extraordinary success. He is one of the most brilliant of the younger generation of violinists.

SEILLÈRE, ERNEST, BARON (1866–), French philosophical writer, born at Paris. His family came from Lorraine and was allied to the Talleyrand-Périgord, Berglas Saint-Winock, and other patrician strains. He studied at the Ecole Polytechnique in Paris, but instead of pursuing the engineering profession he devoted himself to literature and social philosophy. Strongly influenced by Nietzsche and the doctrine of the will to power, Seillière developed what he called the philosophy of imperialism, that is to say, a philosophy of masculine activity, service and organization as opposed to the effeminate romanticism of Rousseau. He traced all the modern evils, political, social, and æsthetic, to the influence of romanticism. Curiously enough, Seillière was a partisan of Bergson's intuitional philosophy, and even his own doctrine was characterized as an inverted romanticism. The list of his works include: *Ferdinand Lasalle* (1897); *Le Parti Socialiste Allemand* (1898); *La Philosophie de l'Impérialisme; Le Comte de Gobineau* (1903); *Appolon ou Dionysos* (1906); *Nietzsche* (1905); *L'Impérialisme Démocratique* (1907); *Schopenhauer* (1909); *Barbey d'Aurevilly* (1910); *Gustave Flaubert* (1914); *Mme. Guyon et Fénelon* (1918); *Les Origines Romanesques de la Morale Romantique* (1918); *Georges Sand* (1919); *Sainte-Beuve* (1920); *Jean Jacques Rousseau* (1921); *Balzac* (1922).

SEISMOLOGY. Not much was added in 1914–24 to knowledge of the character and effects of earthquakes; their ultimate cause was still very incompletely understood. It was well established that tectonic quakes are due to the movements and vibrations caused by the shock resulting from sudden slips within the solid material of the earth's crust, from fracture consequent on a state of stress; but this practically marked the limit of the science.

Oldham concluded that the faulting of the crust, the direct cause of destructive shocks, is the secondary result of a more deep-seated disturbance of some kind, and that it is the latter, and not the former, which produces the records on distant seismographs. G. W. Walker, following up certain investigations begun by Galitzin on the angle of emergence of the wave paths, likewise found that the focus, although sometimes quite close to the surface, is frequently at a depth of from 300 to 500 miles or more. These conclusions have been confirmed by H. H. Turner through a study of the times of arrival of seismic waves at the antipodes or anticentre. Turner's results for the relative depths of foci suggest that they collect around three chief values, and by identifying these with the three critical surfaces at the respective depths of 106, 232, and 492 kilometers which were previously discovered by Galitzin from direct observations of the angles of emergence at Pulkovo, Turner obtained a value for the surface velocity of P waves agreeing with that observed in the case of the great Oppau explosion on Sept. 21, 1921. He found that 207 kilometers is the depth of the average focus corresponding to the standard seismological tables in use. The destructive quakes probably are those originating in the uppermost layer. On the other hand, Jeffreys, in a study of the waves from the Pamir quake of Feb. 18, 1911, concludes that Walker's theories are totally incorrect.

C. G. Knott finds that the rate of transmission of both the P and S waves increases continuously with distance below the surface until the wave path attains a depth about 0.3 the earth's radius. The wave paths reaching lesser depths than this have a continuously curved form, convex toward the centre of the earth; below this the rate of propagation is nearly

constant, even decreasing at certain depths so that some of the wave paths are concave toward the centre in part of their course. Below 0.6 of the radius the distortional or S wave is killed and is not registered at distances greater than 120° from the epicentre The rate of propagation of the two forms of wave motion is about 6.2 and 4.0 kilometers per second respectively, near the surface of the earth, and about 12.8 and 6 8 at depths over 1500 kilometers. A new investigation of the propagation of seismic waves has also been carried out by J. H. Jeans, who points out that in addition to the Rayleigh L waves there are two series of surface waves which travel around the earth in 126 and 222 minutes respectively. The propagation of seismic waves in a visco-elastic earth has been studied by Hosali.

From a study of the waves generated by the Oppau explosion, which were undoubtedly truly representative of the uppermost layers of the earth's crust, in south Germany, the Netherlands, and Alsace, Wrinch and Jeffreys have found the velocities of the P and S waves to have been respectively 5 4 and 3.15 kilometers per second, considerably less than in the case of ordinary earthquake waves. The Rayleigh waves, being characteristic of the lower basaltic and peridotic layers, were absent, and in their place appeared the Love waves, transmitted largely through the continental granitic layer.

Whether any variations occur in the periods of seismic waves as they radiate outward from the origin has for some time been doubtful. From a detailed study of the records of the California quake of Jan. 31, 1922, J. B. Macelwane found that the period of a long wave at the beginning of the first preliminaries decreases, and that of a very short superposed wave increases, as the distance from the epicentre increases. No relation could be discovered between the periods of the S waves and the epicentral distances. The periods of two maxima in the shorter waves of the principal portion showed a rapid increase with distance.

Under the direction of the Advisory Committee on Seismology of the Carnegie Institution, there has been concentrated on the study of the earth movements and seismic tremors of California probably the greatest assemblage of coöperating agencies ever put to work on a single scientific problem The United States Coast and Geodetic Survey is engaged in laying a network of precise primary triangulation over the State and connecting it with points in Nevada and elsewhere, in order to provide a basis for detecting movements of the crust in California and to verify the slow creeps previously indicated by astronomical observations at the Ukiah latitude observatory and at the Lick Observatory. The survey has already detected irregular movements of 4 to 16 feet which have occurred since the last surveys, made about 1895, mostly northward south and west of the San Andreas fault, and southward north and east of it. The United States Geological Survey, in coöperation with the Seismological Society of America and various geologists, has mapped all known faults in the State, and the Society has published a map showing all these faults; the localities where quakes may be expected are thus indicated, and in these zones the proper location, design, and construction of buildings and other structures may be made to minimize the danger from earthquakes. To aid in tracing the faults out to sea, the United States Hydrographic Office, by means of a new acoustic sounding device, has made a unique contour map of the ocean bottom off the southern California coast out to beyond the edge of the continental shelf. Anderson, of the Mt. Wilson Observatory, has devised a remarkably sensitive portable torsion-pendulum seismometer, which is extraordinarily simple, cheap, and easily set up; the entire instrument weighs only a few pounds, it can be adjusted to record quakes occurring at any distance, and great numbers of these instruments may be set up about the country and used to study in detail the propagation of seismic waves from local tremors through the heterogeneous crust.

The examination of long series of earthquake records has suggested the existence of a number of interesting periodicities in earthquake frequency. Those whose existence seems most certain are 4 years, 15 months, 6 months, and 21 minutes in length, particularly in Jamaica and Italy. After a careful and extensive study of the microseisms which seem to travel from western Europe across Russia into Siberia, dying out as they go, Galitzin concluded that they are not caused by waves beating on the western coast of Europe, as had been supposed. Heavy waves are not always accompanied by micros, and micros frequently exist when there are no heavy waves. J. J. Shaw discovered that individual microseisms could readily be identified on seismographs separated by as much as two miles, and then travel across the country studied in detail. The most interesting fact thus brought to light was that at a given station they seemed invariably to come from the same direction whenever they occurred at all When the distance between stations was increased to 8 or 10 miles, however, the individual micros could not be traced from station to station.

The great Russian seismological organization did a vast amount of valuable work under Galitzin, but with the death of its famous leader and the political revolution, it gradually went out of existence. Seismological work in Russia was recommenced at several stations in 1923 Galitzin improved the Milne seismograph almost out of recognition, producing the best such machine yet devised. The much less elaborate and less expensive instrument devised by J. J. Shaw is but little inferior to Galitzin's.

The International Seismological Association was dissolved in April, 1922. A section of the International Geodetic and Geophysical Union of the International Research Council, organized in 1919, is devoted to seismology. The first meeting was held at Rome in 1922 and the second at Madrid in 1924.

The following eminent seismologists died during the decade: Prince Boris Galitzin, May 4, 1916; J. Perry, Aug. 5, 1920; G. W Walker, Sept. 6, 1921; C G. Knott, Oct. 26, 1922; Fusakichi Omori, Nov. 8, 1923, and Otto Klotz, Dec 28, 1923.

Bibliography. New books of importance on seismology were: C Davison, *A Manual of Seismology* (Cambridge Press, 1921); G. W Walker, *Modern Seismology* (London, 1913); B Galitzin, tr. O. Hecker, *Vorlesungen uber Seismometrie* (Leipzig, 1914); O. Klotz, *Seismological Tables* (Ottawa, 1916); H. O. Wood, *A List of Seismologic Stations of the World* (Washington, 1921). See EARTHQUAKES.

SELANGOR. See MALAY STATES, FEDERATED.

SELENIUM OXYCHLORIDE. See CHEMISTRY.

SELF-DETERMINATION. See RACIAL MINORITIES TREATIES.

SELLARS, ROY WOOD (1880–). American college professor and author, born at Egmondville, Ont, and graduated at the University of Michigan in 1903. He began teaching at the University of Michigan in 1905 and became assistant professor of philosophy there in 1918. He wrote: *Critical Realism* (1916); *The Next Step in Democracy* (1916); *The Essentials of Logic* (1917); *The Next Step in Religion* (1918); *Essays in Critical Realism* (1921); *Evolutionary Naturalism* (1921).

SENATE RESERVATIONS. See UNITED STATES, *History.*

SENESCENCE. See ZOOLOGY.

SENSATION, CUTANEOUS AND ORGANIC. See PSYCHOLOGY, EXPERIMENTAL.

SENUSSITES. See PAN-ISLAMISM.

SEPIS, MEDICAL. See RHEUMATISM, CHRONIC.

SEPTIC TANKS. See SEWERAGE AND SEWAGE TREATMENT.

SERAFIN, TULLIO (1880–). An Italian conductor, born at Cavarzere. After graduation from the Milan Conservatory he joined the orchestra at La Scala as viola player. His successful début as conductor, with *Aida* in Ferrara, resulted in his engagement for the Teatro Regio in Turin, where he remained till 1908, when he succeeded Toscanini as principal conductor at La Scala in Milan. In 1914–15 he was at the Carlo Felice in Genoa, in the summer of 1915 in Havana, and during the winter of 1915–16 at the Opera Real in Madrid. He then served in the Italian army, and after his return was once more at the Teatro Regio in Turin until 1921, when he went to the San Carlo in Naples. In the fall of 1924, he was engaged for the Metropolitan Opera House, New York. He made frequent appearances as guest conductor in Paris, London, Rome and Buenos Aires. He ranks with the foremost operatic conductors of the world.

SERBIA. Formerly a Balkan kingdom with an area of 36,937 square miles. In December, 1918, it was proclaimed a part of the new Unitary State of the Serbs, Croats, and Slovenes (Jugo-Slavia). See JUGO-SLAVIA for matters pertaining to population, industry, trade, finance, etc.

History. The murder at Sarajevo of the Archduke Francis Ferdinand and his consort on June 28, 1914, as the result of the plotting of a group of Bosnian Serb students, was succeeded by a silence that, at first by the optimistic, was regarded as a hopeful augury. It was impossible that the unfortunate event should be in any respect interpreted as having had the official support of the Serbian government. But the ultimatum of July 23 dispelled all hopes that Austria-Hungary meant to treat the question in a charitable light. The onerous terms imposed, the refusal to accept the offers of mediation tendered by the other powers, and even the rejection of the Serbian reply which indicated a willingness to concede most important points under discussion, indicated that the Dual Monarchy meant to precipitate a conflict. On July 28, Austria-Hungary declared war on Serbia. Thenceforth Serbia's destiny was not her own. Ever at the mercy of an Austro-German thrust on the one hand, and playing the rôle of a tool of a vacillating Allied policy on the other, it was inevitable that Serbia should be racked by the horrors of war perhaps more cruelly than any other combatant. Serbia was encouraged to stand up against the Austrian army with the promise at first of Russian assistance, and then Allied aid from Saloniki. Neither came, with the result that Serbia was crushed There were temporary successes at first. The Austrian army was thrown back across the Save and Drina Rivers in August, 1914, again in September, and once again in December. The last victory was a Pyrrhic one. Exhausted by the effort, and in the grip of a typhus epidemic which swept away a quarter million of Serbs, the nation was compelled to remain quiescent throughout the whole of 1915. Meanwhile the machinations of the Allied diplomats tended to aggravate Serbia's position rather than to relieve it. To encourage Italy's and Bulgaria's entry into the War, promises were made that cut squarely across Serbia's interests. From the Italian point of view a united Jugo-Slav state spelled danger; for the conciliation of Bulgaria large concessions in Macedonia had to be offered. A greater neglect, however, was the failure to support Serbia from the military point of view With Bulgaria's entry into the War on the side of the Central Powers, a great Austro-German-Bulgarian enveloping offensive was launched in October, 1915. In a few weeks Serbia, unaided, was completely conquered and the military and civil populations were compelled to flee to the south and the west Corfu became the temporary capital of the fugitive government while Serbia was divided between Austria and Bulgaria (by December 14). Bulgaria went so far as to declare that Serbia no longer existed and proceeded to enroll Serbs in her army, confiscate the land, and institute the Bulgar language. Thousands were deported for work in enemy countries. Serb history at Corfu during the three years of exile is a mélange of party jealousies. There could be no democratic representation; cliques shouldered one another in an attempt to gain what little prestige there was in heading a meaningless government. On Feb. 12, 1918, a parliament met at Corfu, but its accomplishments were little. Serb patriots were up in arms against Jugo-Slav patriots; to the day of the Armistice it was impossible to foretell whether the aspirations of the Serbs, Croats and Slovenes were ever to be realized. For the events of 1918–24, see JUGO-SLAVIA.

SERBS, CROATS, AND SLOVENES, KINGDOM OF. See JUGO-SLAVIA.

SETON, JULIA (1862–). An American lecturer and writer, born at Chicago. She was graduated from the Medical Department of the Denver-Gross College in 1898, and took postgraduate courses at Tufts Medical College. She practiced medicine in Denver and in Boston, and began metaphysical healing in the latter city in 1904. In 1906, she removed to New York City and there founded the New Thought Church and School. She lectured in the principal cities of the United States and in Europe, and wrote *Concentration—The Secret of Success* (1907); *Marriage* (1914); *The Race Problem* (1914); *Adrienne Le Baron,* a novel, (1915); *Destiny,* a novel, (1917); *The Outside and Inside of Life,* and *The Self in Tune.*

ŠEVČIK, OTAKAR (1852–). A Bohemian violinist (see VOL. XX). In 1921, he taught a master class at the Ithaca Conservatory of Music, and in 1922–23, a similar class at the Chicago Musical College Not less than 700 of his pupils became teachers or orchestral performers in the United States alone. During his stay in this country he put the finishing touches to his life work, a complete method for the violin, from the first rudiments to the last degree of virtuosity. The first section, *School of Intonation* (15 parts and two supplements, with English, German and French text) was published at New York in 1922; the printing of the second section, *School of the Virtuoso* (12 parts) was begun in the spring of 1924. Judging from the published portion, the work is not only the most voluminous and comprehensive of its kind, but seems destined to live as a lasting monument to the genius of one of the world's greatest teachers.

SÈVRES, TREATY OF. See DARDANELLES AND BOSPORUS STRAITS; CILICIA; DODECANESE; PEACE CONFERENCE AND TREATIES; SMYRNA; TURKEY.

SEWERAGE AND SEWAGE TREATMENT. Where a high degree of sewage treatment is considered necessary, main reliance is most commonly placed on oxidation by means of sprinkling filters, also known as trickling or percolating filters, preceded by more or less treatment and in some cases followed by further treatment. Since, say, 1916, the activated-sludge process has been coming to the front in England, the United States, and Canada and has been taken up in a small way in India.

Rational Control of Water Pollution. Much attention was given to the classification of streams and other natural bodies of water with a view to putting regulations designed to prevent pollution on a more rational basis than formerly. A notable example of this is afforded by the report on the pollution of boundary waters between the United States and Canada, made in 1918 by the International Joint Commission created many years earlier by a treaty between Great Britain and the United States. The waters involved include the Great Lakes, the Rainy, St. Mary's, St. Clair, Detroit, and Niagara Rivers and to some extent the St. Lawrence as well. The studies were conducted by eminent engineers, chemists, and bacteriologists in official and private life in the United States and Canada. The report recognizes that the utilization of rivers and lakes to receive the sewage of cities is a legitimate and proper function so long as this can be done without menace to public health or the creation of nuisances by offense to sight and smell, and also that the amount of sewage which may properly be discharged into adjacent waters by any city should be determined by a careful study of all governing local conditions, including particularly whether or not public water supplies would be endangered by the sewage, and if so the permissible burden on water treatment plants. This burden, the report states, should not exceed 500 bacteria of the colon type per cubic centimeter as an average for the year, determined by samples taken in a manner specified in some detail. The report proposed that before discharge into the Detroit and Niagara Rivers, sewage should be treated to such a degree that the water receiving it would correspond to sewage diluted by a stream flow of four cubic feet per second per capita of contributing population. In Pennsylvania the Sanitary Water Board, composed of representatives of State departments having to do with health, fisheries, and other aspects of the waters of the State, in 1923 divided the streams of the State into three general classes, according to degrees of pollution and uses to which the streams are put, and established general principles to control their pollution. These principles were in general accord with those followed quite recently by the State Department of Health in passing on plants for sewage treatment. The New Jersey Legislature of 1924 created a Sanitary and Economic Water Commission. In 1922 the Pennsylvania and New Jersey Departments of Health divided the interstate portion of the Delaware River into three zones and laid down conditions as to the degree of sewage treatment that each department would require, in passing on plans for sewage works in each zone. In Great Britain, through what appears to be cooperative work carried on by the Ministries of Agriculture, Fisheries, and Health, the rivers were divided into three classes: (1) those sufficiently pure to support a considerable stock of fish; (2) those polluted but nevertheless still containing a great number of fish; (3) rivers grossly polluted and containing few if any fish. It was expected that further control of stream pollution through the joint efforts of these Ministries would take this classification into account. For preliminary report of the Steinman Committee on River Pollution, see abstract in London *Surveyor*, Jan. 11, 1924.

Sewage Treatment. For preliminary treatment of sewage and also where it is necessary to do little but remove some of the heavier and coarser solids, bar screens, grit chambers, and fine screens are employed, either singly or in combinations of two or more. Additional solid matter may be removed by sedimentation, either with or without sludge digestion. The latter is used to reduce the volume of solids for final disposal and may be effected in separate sludge digestion tanks, receiving the sludge from either plain settling tanks or from septic tanks, although the latter as originally designed were intended to effect both sedimentation and sludge digestion in one tank. Two-story septic tanks of either the Travis or Imhoff type, in which the sludge is retained for digestion in the lower chamber, are the most widely used type, particularly the Imhoff tank in Germany and the United States. In England a few Travis tanks are used, but for the most part either the one-story tanks, plain settling or septic, are employed, except that chemical precipitation is still used in several places where it was installed many years ago. Sludge from the various tanks, other than chemical precipitation, is generally de-watered to a considerable degree by placing it on sludge-drying beds consisting of sand above and gravel below, with underdrains in the latter. Chemical precipitation sludge is generally de-watered by filter presses.

Chemical precipitation fell off rapidly after the one-story septic and Imhoff tanks came into use. With the completion of an installation of Imhoff tanks under construction at Worcester, Mass., in 1924, Providence, R. I., would be the only city of considerable size in the United State and one of a very few of any size in that country still employing chemical precipitation

which never gained such a foothold in America as it did in England. Where tank treatment, with or without previous screening, is insufficient, the most common method of further treatment is by sprinkling it onto beds of coarse material and letting it percolate or trickle through the beds over the particles of filter media, which are generally broken stone in the United States and either stone or cinders in England. Large total areas of sewage film are thus exposed to contact with the air, and bacterial reduction by oxidation is effected. Sewage sprinklers in the United States are generally of the fixed nozzle type, while in England some form of moving distributor is more commonly used, consisting of perforated pipe either in the form of revolving arms or else mounted at each end and moved forward on wheels running on tracks on each side of the bed.

Activated-Sludge Process. In the activated-sludge process, the sewage, either as it comes to the works or else after preliminary treatment to remove some of the solid matter, is passed through tanks at the bottom of which are either porous plates or perforated pipes through which air under low pressure is discharged upward. A considerable amount of sludge is allowed to accumulate and is retained in these tanks. The compressed air raises the sludge, keeps it in suspension, and causes the whole mass of sewage and sludge, teaming with bacterial life, to "boil." From the activation tanks, the liquid portion of the sewage and a part of the sludge are drawn to settling tanks. From these tanks the clarified liquid or final effluent is drawn off and sent to the stream or other body of water chosen to receive it. If the sludge, i.e. solid matters highly diluted with water, is to be utilized as a fertilizer basis, then the moisture must be reduced to 10 per cent. Owing to various difficulties encountered, de-watering has presented more problems than was expected at the outset. These problems could hardly be regarded as having been solved to the general satisfaction of engineers in 1924, although some of the larger plants under construction were proceeding on the basis that sludge could be satisfactorily de-watered and probably ultimately sold as a fertilizer base. About 20 cities in the United States and seven in Canada had activated-sludge plants in operation up to the middle of 1924, and four additional plants were projected for early construction in Canada.

Various Large Projects. When the Chicago Sanitary District completed its programme it would have altogether seven sewage works of various types and combinations of types designed to treat the sewage of Chicago and vicinity so that it might continue to be discharged into the Chicago Drainage Canal and passed on down through the Desplaines and Illinois Rivers to the Mississippi without creating a nuisance. These works were made necessary by the large growth in population since the diversion of the sewage from the Lakes, accomplished in 1900, and because up to 1924 the district had not succeeded in getting authorization from the Federal government to use as much diluting water as the original plans contemplated, was still in litigation with the Federal government and several States, and was faced with protests from Canada on the subject of diversion. Late in 1923, Philadelphia officially opened its northeast sewage works, consisting of 32 Imhoff tanks and 80 sludge-drying beds with a rated capacity of 60,000,000 gallons a day. Ultimately this plant was to have a capacity of 250,000,000 gallons a day to serve a population of 300,000 people. Philadelphia's southwest plant was under contract in 1924 and its southeast plant projected. The three plants were to have a total capacity of 800,000,000 gallons daily. Baltimore had a large installation of settling and separate sludge digestion tanks and sprinkling filters. In New Jersey, the Passaic Valley sewerage district, including Newark, Paterson, and many other municipalities, expected to have its project of sewage collection and disposal, long under construction, completed and in use in 1924. The project included a trunk sewer from Paterson to a point on the Newark Meadows, a pumping plant and settling tank on the Meadows, and a tunnel beneath Newark Bay and the Bayonne peninsula and into New York Bay. Los Angeles was building a new trunk outlet sewer to a point on the Pacific coast at Hyperior, a screening plant there, and an ocean outlet in 1924.

Bibliography. Metcalf and Eddy, *American Sewerage Practice*, three vols., and also a one-volume edition (New York); Babbitt, *Sewerage and Sewage Treatment* (New York); Folwell, *Sewerage*, new edition (New York); and Wagenhalls, Thériault, and Hammon, *Report on Sewage Treatment in the United States* (Washington), a Public Health Service study of 15 representative plants. See MUNICIPAL OWNERSHIP.

SEX DETERMINATION. See LIVE STOCK; ZOÖLOGY.

SEX INSTINCT. See PSYCHOLOGY, ABNORMAL.

SEX STUDIES. See SECRETIONS, INTERNAL.

SEYFFERT, LEOPOLD (1888–). An American artist, born at California, Mo. He studied at the Pennsylvania Academy of Fine Arts and, after winning two foreign scholarships, continued his artistic education in Paris and Spain. In 1912 he gained the fellowship prize of the Pennsylvania Academy of Fine Arts, a gold medal of the Art Club of Philadelphia in 1913, a silver medal at San Francisco in 1915, the Hallgarten prize in 1916, the Altman prize in 1917, the Beck gold medal in 1918, the Temple gold medal in 1921, and the Proctor prize in the same year. His work is represented in several of the most important art galleries in the country.

SEYMOUR, CHARLES (1885–). An American educator and historian, born at New Haven, Conn. He was graduated from Cambridge University in 1904 and from Yale in 1908, taking postgraduate courses at the latter and in Paris. In 1911, he was appointed instructor in history and in 1918 professor of history at Yale. At the Peace Conference in Paris in 1919, he was chief of the Austro-Hungarian Division of the American Commission to Negotiate Peace, and was also delegate on other commissions dealing chiefly with the Balkans. Among his writings are: *Electoral Reform in England and Wales* (1915); *The Diplomatic Background of the War* (1916); *How the World Votes* (with D. P. Frary, 1918); *Woodrow Wilson and the World War* (1921). He edited, with Col. E. M. House, *What Really Happened at Paris* (1921).

SHACKLETON, SIR EBNEST (1874–1922). An English Arctic explorer (see VOL. XX). From 1914 to 1916 he went on an Arctic explor-

ing trip, although he had offered his services to England the moment the War broke out. In 1919, at Archangel, his knowledge proved invaluable in providing comforts to the soldiers there. In 1921 he undertook his last Arctic voyage, which was to be a 30,000-mile journey in the south Atlantic and the Antarctic. He died off the whaling point Grytviken on South Georgia Island and was buried there in a coffin made by Norwegian whalers. By a strange chance Grytviken had been the jumping-off point of his 1914 expedition. See POLAR RESEARCH.

SHALE OIL. See CHEMISTRY, ORGANIC.

SHALIAPIN (CHALIAPINE), FEODOR IVANOVITCH (1873–) A Russian dramatic bass, born at Kazan. Without any preliminary musical training, he became, in 1890, a member of the chorus of a traveling light opera company, whose director immediately was struck by the exceptional beauty and power of his voice and soon entrusted him with leading rôles. In 1892–93, he studied systematically with Usatov in Tiflis, and during the summer season of 1894 he made his début in grand opera at the Maryinsky Theatre in Petrograd, where he remained two years. In 1896, he joined Mamontov's Private Opera in Moscow, whence his reputation, especially as an unsurpassed interpreter of Russian national types, rapidly spread all over Europe. His first appearances at the Metropolitan Opera House, New York (1907–08) did not arouse unusual enthusiasm, probably because he had no opportunity of singing his famous Russian rôles, but when, on his second visit, he appeared as Boris Godunov (Dec. 9, 1921), his success was overwhelming. Likewise, his recitals drew capacity houses. Later he became an annual visitor, dividing his time between the Metropolitan Opera House and the Chicago Civic Opera Company.

SHANDAKEN TUNNEL. See TUNNELS; AQUEDUCTS.

SHANNON, CHARLES HAZLEWOOD (1865–). An English painter (see VOL. XX). In 1918 he became vice president of the International Society of Sculptors and Gravers. His later works include "The Embroidered Shawl" (1918) and the lithographs, "Ebb Tide" (1917); "The Tidal River" (1919); "A Sharp Corner" (1919). He also painted several portraits, including those of Princess Patricia of Connaught, Lillah McCarthy, and Hilda Moore ("The Lady in Black").

SHANNON, EFFIE (?–). An American actress, born at Cambridge, Mass. She began to act at 10 years of age, as Eva in *Uncle Tom's Cabin*, and appeared as an ingenue in many popular plays. She played with Rose Coghlan in *Diplomacy*, with Herbert Kelcey in *The Moth and the Flame, His Lord and Master, The Thief*, etc. She took part in *The Years of Discretion* under the direction of David Belasco during 1913–14 and played in *Children of Earth* in 1915. She also appeared in *Under Orders, Mama's Affair, The Detour*, etc.

SHANNON, FREDERICK FRANKLIN (1877–). An American clergyman and author, born in Morris County, Kan., and educated at Harvard University. He was ordained to the Methodist ministry in 1899, and after preaching in West Virginia and in Grace Church and the Reformed Church on the Heights in Brooklyn, N. Y., he became pastor of the Central Church in Chicago in January, 1920. His writings include: *The Soul's Atlas and Other Sermons* (1911); *The New Personality* (1915); *The Enchanted Universe* (1916); *The Breath in the Winds* (1918); *God's Faith in Man* (1919); *The Economic Education; The Land of Beginning Again; The New Greatness.*

SHANTUNG. A Chinese maritime province; area 55,970 square miles; estimated population, 25,810,000. Shantung first entered upon western attention in 1898 when Germany extorted from China a 99-year lease of Kiaochow Bay with a surrounding area of 193 square miles, as well as large commercial concessions in the hinterland. The German policy was consistently enlightened. A railway was built (the Tsingtau-Tsinan line), a postal service established, and work was carried on in afforestation, the checking of floods, the building of roads and harbors. Schools were founded as well as eleemosynary institutions, the attitude of the Germans toward the Chinese being always amiable if paternalistic. On Aug 23, 1914, in compliance with the terms of the Anglo-Japanese Alliance, Japan declared war on Germany and moved immediately on Kiaochow. Troops were landed outside the leased area in the Shantung peninsula, in violation of Chinese neutrality; the Shantung railway was seized, and an attack by land and sea was launched against the powerful fortifications of Tsingtau. The city capitulated November 7 and three days later the leased territory of Kiaochow was formally taken over by Japan, with a view, ostensibly, to its eventual restoration to China. Upon this promise the Chinese looked with misgivings; their suspicions received confirmation only too soon, when in 1915, China was compelled to comply with the celebrated "21 Demands" (see CHINA). As regards Shantung, the demands called for: (1) Chinese agreement in advance to any understanding Japan might effect with Germany respecting German interest and concessions in Shantung; (2) an engagement on the part of China not to lease or cede to any other power any territories in Shantung; (3) Chinese consent to the building of a Japanese railway connecting Chefu or Lungkow with the Tsingtau-Tsinan railway; (4) a promise from China to open certain important cities and towns in the province for the residence and commerce of foreigners. Chinese protests were unavailing. The terms of the ultimatum were written into a treaty and a series of notes interchanged on May 25. By these China accepted the abovementioned engagements, while Japan, in recognition of Chinese counter-claims, pledged herself to return the leased territory of Kiaochow to China "if upon the conclusion of the present war, the Japanese government should be given an absolutely free disposal of the leased territory of Kiaochow Bay." The preoccupation of Europe with the War, Japan used to her further advantage. In 1917, by a series of secret treaties with the Allies, Japan forced the definite guarantee of her economic interests in Shantung. China's virtual consent was received when, on Sept. 21, 1918, the Chinese government entered into a formal agreement with Japan on these matters and accepted 20,000,000 yen. The whole matter, however, had previously been complicated by the entry of China into the War on the side of the Allies.

The general interest in Shantung, as the Peace Conference sat, was one of the most cu-

rious phenomena of this period. The Japanese, their representatives could say, sought no more than the French and British already possessed in China, i.e. economic exploitation of designated areas, while their demands encompassed less than a complacent world willingly granted to Great Britain, France, Italy, and Greece, in Africa, Asia Minor, and the Pacific Too, they had reduced a formidable fortress in Tsingtau, and this they looked on as one of the spoils of war. To liberal opinion, in England, but in America particularly, the despoiling of China meant a cynical repudiation of the lofty purposes of the War. Japan took her stand on secret treaties; moreover, China was not an enemy but an ally, even if a tardy one. It was pointed out, by Americans, that Japanese proximity to China rendered the problem not so much one of economic aggression as of political submergence. About this position President Wilson's objections to the Shantung cession were formed. For a long time he resisted the pressure of the Peace Conference, and it was only the withdrawal of Orlando and the fear of complete disruption of the proceedings by the alienation of the Japanese, that on Apr. 30, 1919, he gave a reluctant consent. Kiaochow Bay was to go to Japan by the treaty; but the Japanese delegates orally assured Mr. Wilson of their intention subsequently to return the leased territory to China. Accordingly, articles 156–158 of the Versailles Treaty transferred to Japan the German lease of Kiaochow Bay, as well as all German mining and railway concessions and other German property or rights in Shantung. These clauses gave Japan virtual, though not legal, sovereignty over the leased area, and economic sovereignty over the whole province.

In the United States disapproval of these terms was expressed in one of the 15 reservations which the American Senate adopted in November, 1919 (though not by the necessary two-thirds) with regard to the treaty. Reservation six ran. "The United States withholds its assent to Articles 156, 157, and 158, and reserves full liberty of action with respect to any controversy which may arise under said articles between the Republic of China and the Empire of Japan." China, for her part, emboldened by American sympathy, refused signature to the Treaty of Versailles and adopted a policy of passive resistance, ardently patriotic Chinese students taking the lead in the popular outcry against what they considered a national disaster. A popular boycott against Japanese goods spread so rapidly that at one time Japan's trade with China was reduced 80 per cent. This opposition, reinforced by Anglo-American pressure, compelled the Japanese government to employ more amicable methods toward China During 1920 and 1921 Japan repeatedly tried to open negotiations on the basis of the restoration of Chinese political rights in return for non-political concessions to Japanese interests. China, however, was adamant. China had not been a party to the treaty and was therefore not bound by its terms, was the substance of the Chinese position. Matters stood at this stage when the Washington Conference (q.v) assembled. The problem was still too much an American concern for the Conference to attempt to neglect or circumvent it. Japanese and Chinese representatives, delegated to discuss the matter, found a solution difficult, if not impossible. The meetings for a time reached a complete halt on the question of control of the Shantung railway, which, in effect, implied general economic control Only as a result of the mediation of Mr. Hughes and Mr. Balfour was an understanding effected and a separate Sino-Japanese agreement signed, Feb. 4, 1922. The treaty meant a complete triumph for China and a vindication of at least one of the idealistic principles of the War. Its provisions called for the restoration of the leased territory of Kiaochow to China with all German or Japanese public properties therein; the withdrawal of Japanese troops and gendarmes from Shantung, the sale of the Tsingtau-Tsinanfu Railway with all its branches and all its properties to China for the sum of 53,406,141 gold marks (about $12,700,000); during the five years allowed for payment the railway was to have a Japanese traffic manager and Japanese and Chinese chief accountants of equal rank Other sections called for the reëstablishment of a Chinese customs house at Tsingtau and for the creation of a Chinese company (in which Japanese capital might not exceed the amount of Chinese capital) for the operation of the mines of Tsechuan, Fangtse, and Chinling-Chen. By December, 1922, Japan had evacuated the province. The influence of the settlement was shown by the fact that the French offered to return Kwang-Chou-Wan and the British Wei-Hai-Wei on the basis accepted for the Shantung restoration.

The period of Chinese occupation, 1923–24, justified, in one sense, the highest hopes entertained for it, and in another, displayed lamentable weaknesses. A militarist of the old school, General Hsiung, was appointed director-general, i.e. mayor, of Tsingtau; the head of the finance department was accused of diverting funds to Peking, the administration of the wharves, the most important single source of income for the city, was woefully inefficient; the young foreign-educated Chinese were discriminated against openly. On the other hand, material progress was marked. The police were efficient; the roads were kept in good repair; afforestation went on rapidly. On the Shantung Railway, a Chinese staff, made up of returned students, replaced the Japanese, and operation was so successful (business was 15 per cent greater than in the previous year) that for the year 1923–24 profits were sufficient to pay the interest on the money due the Japanese.

SHANTZ, HOMER LEROY (1876–). An American botanist, born at Kent County, Mich. He was graduated from Colorado College in 1901 and took postgraduate courses at the University of Nebraska. He was instructor of botany and zoölogy at Colorado College and instructor of botany at the University of Nebraska and the University of Missouri In 1907, he was appointed professor of botany and bacteriology at the University of Louisiana. He served as special agent in the United States Bureau of Plant Industry, and from 1910 to 1919 was plant physiologist in charge of physiological and fermentation investigations. He was a member of many scientific societies and contributed articles on botany to scientific journals and publications of the United States government. He was agricultural explorer for the Smithsonian Institution African Expedition in 1919–20, and carried on other explorations in Africa.

SHAPLEY, HARLOW (1885–). An American astronomer, born at Nashville, Mo. He studied at the University of Missouri, and took his Ph.D. at Princeton in 1913. In 1914, he became astronomer at Mt. Wilson Observatory of the Carnegie Institution, remaining there until 1921 when he accepted the directorship of the Harvard Observatory. His original investigations were devoted to studies in photometry and spectroscopy, as well as to the orbital theory and computation on which he contributed important papers to the literature of astronomy.

SHARLOW, MYRNA DOCIA (1893–) An American dramatic soprano, born at Jamestown, N. D. Having studied piano and voice at the Beethoven Conservatory, she continued her vocal studies with F. E. Bristol (1911–13) and with E. Clément in Paris (1914). Her operatic repertory she acquired under Campanini, Moranzoni, Weingartner and S. Wagner She made her début with the Boston Opera Company as Stella in Offenbach's *Contes d'Hoffmann* (Nov. 25, 1912) and sang with that organization until 1914 From 1915 to 1921 she was a member of the Chicago Opera Association, and again in 1923. In 1914, she appeared at Covent Garden. She is gifted not only with a glorious voice, but is also a splendid actress. Her favorite rôles are Tosca and Brünnhilde in *Siegfried* In 1921, she married Edward B. Hitchcock.

SHARP, WILLIAM GRAVES (1859–). An American diplomat (see VOL XX). He was a member of Congress from Ohio from 1909 to 1914, resigning in the latter year following his appointment as ambassador to France in which office he served until 1919. He was elected a Foundation member of the Société Astronomique de France, having been a lifelong student of that science. He was awarded the Grand Cross and Legion of Honor in recognition of his services as ambassador.

SHARPE, HENRY GRANVILLE (1858–). An American army officer, born at Kingston, N. Y., and graduated from the United States Military Academy in 1880. Most of his official employment was in the commissary department. He had charge of the relief of flood sufferers at Cairo, Ill., and Memphis, Tenn., in 1897, and was on duty in Porto Rico in 1898 and in the Philippines from 1902 to 1904. He was in France in 1919. He wrote: *The Art of Subsisting Armies in War; The Art of Supplying Armies in the Field as Exemplified during the Civil War; The Provisioning of the Modern Army in the Field; The Quartermaster Corps in the Year 1917 in the World War* (1921).

SHAW, GEORGE BERNARD (1856–). An English author and dramatist (see VOL. XX). In 1914 he wrote *Common Sense About the War*, which was so outspoken as to offend many, and throughout the War he aroused considerable irritation by what was considered untimely defense of the Germans and fault-finding with the Allies. Other later books were: *How to Settle the Irish Question* (1917); *Peace Conference Hints* (1919); and the plays: *O'Flaherty V.C., The Inca of Perusalem* (1915); *Augustus Does His Bit* (1916); *Heartbreak House* and *Annajanska* (1917); *Back to Methuselah*, a cycle of five plays (1921); *Jitta's Atonement* (1922); and *Saint Joan*, which was played in New York City in 1924.

SHAW, JAMES BYRNIE (1866–). An American mathematician, born at Remington, Ind. He studied at Purdue University. During 1890–98, he was professor of mathematics at Illinois College, and later held a similar chair at Kenyon. From 1903 to 1910, he was professor of mathematics at the James Milliken University, and in the latter year was called to the University of Illinois, where in 1918 he became professor. Professor Shaw made a specialty of algebra, particularly of multiple and linear associative algebra, on which he contributed important papers to mathematical journals. In addition to many papers, he wrote *Synopsis of Linear Associative Algebra* (1907), and *Lectures on the Philosophy of Mathematics* (1918).

SHAW, J(OHN) W(ILLIAM) (1863–). An American Roman Catholic Archbishop, born at Mobile, Ala. He was educated at the Academy of the Brothers of the Sacred Heart at Mobile, and at St Finian's Seminary in Ireland. He studied also at the University of the Propaganda at Rome, and was ordained to the priesthood in 1888, becoming assistant in the Cathedral at Mobile, and assistant and missionary in St Peter's Church, Montgomery, Ala., and, in 1891, rector of the Cathedral of Mobile and chancellor of the diocese. In 1910, he became Coadjutor Bishop of San Antonio, Texas, and in 1911 Bishop. In 1918, he was consecrated Archbishop of New Orleans.

SHAW, THOMAS (1872–). An English labor leader, born at Colne, Lancaster. He began work in a cotton mill when but eight years old. He was self educated, mastering French and German so thoroughly that he was one of the most skillful interpreters at the international labor conferences which he attended. He was one of the ablest speakers in the English labor movement, and possessed a thorough knowledge of industrial problems. Ramsay Macdonald appointed him Minister of Labor.

SHEEP. See LIVE STOCK.

SHELFORD, VICTOR ERNEST (1877–). An American zoölogist, born at Chemung, N. Y. He was educated at the University of Chicago. He was assistant in zoölogy (1900–01) at West Virginia University; assistant (1904–07), associate (1907–09), and instructor (1909–14) in zoölogy at the University of Chicago; assistant professor (1914–20), and associate professor (1920–) at the University of Illinois, and biologist in charge of the research laboratories of the Illinois Natural History Survey (1914–). He has been active in developing research on ecology and has published *Animal Communities in Temperate America* (1913).

SHELL. See PROJECTILE.

SHERRILL, CHARLES HITCHCOCK (1867–). An American lawyer and diplomat, born in Washington. He was graduated from Yale in 1889 and from the Law School of that university in 1891. He practiced law in New York for several years and in 1909 was appointed minister to Argentina. He served until 1911, when he was obliged to resign from the diplomatic service on account of ill health. In 1912, he resumed the practice of law. He was active in athletics and was the originator of several series of national and international sports. During the War, he served as brigadier-general and adjutant-general of the State of New York in charge of the United States draft. He is the author of *Stained Glass Tours in France* (1898); *Stained Glass Tours in Italy*

(1913); *French Memories of Eighteenth Century America* (1915); *Modernizing the Monroe Doctrine* (1916); *Have We a Far-Eastern Problem?* (1920); *The Purple or the Red* (1924).

SHERRINGTON, SIR CHARLES SCOTT (?–). A British physiologist educated at Cambridge, including a degree in medicine in 1892. He was professor of physiology in the University of Liverpool from 1895 to 1913 and resigned to accept his present chair of Waynefiete professor of physiology at Oxford. He was also formerly Brown professor of pathology in the University of London. He is best known for his researches into the repair of nervous tissue and his major works have been *The Integrative Action of the Nervous System* (1906), and *Mammalian Physiology* (1916). He was knighted in 1922.

SHIP, ARMORED. See VESSEL, NAVAL.

SHIP, MERCHANT. See SHIPBUILDING; SHIPPING.

SHIP, NAVAL. See VESSEL, NAVAL.

SHIPBUILDING AND NAVAL ARCHITECTURE. The design and construction of naval vessels, as well as of merchant craft, fall under this head. They are extensively treated under NAVIES OF THE WORLD and VESSEL, NAVAL. On Jan. 1, 1924, the steady decline in merchant shipbuilding which had been going on since the peak was reached in 1919–20, was still evident. General shipping conditions improved considerably from June 30, 1922, to June 30, 1923, and there had been some gain since that time; but the business and financial conditions throughout the world were not such as to lead to great extension of maritime trade and the demand for more ships. Nearly 7,000,000 tons of shipping were laid up on June 30, 1923 and until much of this was absorbed into active fleets, no great amount of construction could be expected. The total shipbuilding in the various countries of the world in 1922 was 2,467,084 tons, and in 1923, 1,643,181 tons. The tonnage launched in 1923 was less than half of that launched in 1913 and about two-thirds the annual average for the 10 years preceding the War. The launchings in the various countries of the world in the years from 1914 to 1923 are shown in Table I

United States. The Shipping Board and Emergency Fleet Corporation (see the article SHIPPING) began to rush the work of acquiring shipping as soon as the latter was formed and organized in 1917. Contracts were let during the summer and autumn of that year to all shipbuilding companies in the United States to the full amount of their capacities, in some cases to an amount necessitating an extension of their facilities. Late in November, 1917, the Board announced that contracts had been let for 884 new vessels aggregating 4,724,300 tons; that 426 vessels of 3,029,508 tons had been requisitioned on the ways and their construction accelerated; and that contracts were pending for 99 vessels of 610,000 tons. Of the vessels ordered, 379 had wooden hulls; keels had been laid for 166, of which 130 were in yards which did not exist when the contracts were let. The wooden hulls were ordered from 72 yards, 51 of which were new; and the 58 composite ships were given to 4 yards, 3 of which were new. Contracts for the steel ships were awarded to 32 yards, of which 20 were new. Four of the newly ordered ships, 2 of steel and 2 of wood, were launched before the end of the year; and of the requisitioned ships, 49 were launched and completed. In accordance with a special provision of the Urgent Deficiency Act of June 15, 1917, the Shipping Board's Emergency Fleet Corporation awarded contracts for the construction of three government-owned shipyards designed for building fabricated steel ships. These contracts were made with the Submarine Boat Corporation for a plant on Newark Bay, with the American International Corporation for one at Hog Island near Philadelphia, and with the Merchants' Shipbuilding Company for one at Chester, Pa. The yards were to cost $35,000,000 and the government was given an option to purchase the lands on which they were situated. The builders of the yards were given contracts for building in them 200 ships, but further contracts greatly increased the total as well as the capacity and equipment of the yards. In addition, the government furnished money for the extension of private yards, dry docks, etc., and spent about $80,000,000 for housing operations and for purposes of transportation. The total investment of the government in shipbuilding facilities was estimated at $211,000,000. Under the pressure of necessity, new vessels were laid down in constantly increasing numbers; and the construction of vessels in hand was accelerated as far as practicable. One steel vessel of 3500 tons was launched at the Ecorse Yard of the Great Lakes Engineering Works in 14 working days from the time of laying the keel, completed in 29 days; and 34 days after the keel was laid it steamed away in charge of a United States Shipping Board crew. The extraordinary accomplishments of the Fleet Corporation in 1917 and 1918 are shown in Table II.

TABLE II.—WORK OF EMERGENCY FLEET CORPORATION IN 1917 AND 1918 IN DEADWEIGHT TONS

	No.	Deadweight tons	Equivalent in completed tonnage
1917			
Vessels delivered	49	301,809	301 809
Launched but not delivered	57	403,502	322,802
On the ways	391	1,908,735	190,873
Total in 1917			816,484
1918			
Vessels delivered	526	2,983,977	2,983,977
Launched but not delivered	287	1,222,873	978,298
On the ways	391	1,939,225	646,408
Work done on ships begun in 1917	391	1,908,735	445,372
Total in 1918			5,054,055

Immediately after the signing of the Armistice, the Shipping Board began to curtail its programme. Contracts for new work were canceled as far as practicable. The reductions in work thereby entailed were largely offset by

orders given by American corporations on private account and consisted nearly 50 per cent of tankers, in which the Shipping Board programme was inadequate

Foreign Shipbuilding. In Great Britain, the necessity for building cargo ships to replace the waste in the War was realized as soon as the amount of tonnage withdrawn for naval use became known; and this necessity was rendered more urgent by the submarine campaign of 1915. Some steps were taken in that year to increase the amount of shipbuilding, but skilled labor was scarce, as much of it had been diverted to munitions factories, indeed, parts of

TABLE I.—NUMBER AND TONNAGE OF MERCHANT VESSELS OF 100 TONS GROSS AND UPWARDS, LAUNCHED IN THE COUNTRIES OF THE WORLD DURING THE YEARS 1914 TO 1923

	GREAT BRITAIN AND IRELAND		BRITISH DOMINIONS			
			Coasts		Canadian Lake Ports	
Year	No	Tons	No.	Tons	No	Tons
1914	656	1,683,553	58	22,288	22	25,246
1915	327	650,919	27	13,289	4	8,725
1916	306	608,235	36	22,577	4	8,994
1917	286	1,162,896	80	66,475	25	27,996
1918	301	1,348,120	184	230,514	22	49,390
1919	612	1,620,442	235	298,495	28	60,233
1920	618	2,055,624	90	174,557	13	29,087
1921	426	1,538,052	49	118,303	5	11,372
1922	235	1,031,081	37	53,347	2	9,418
1923	222	645,651	41	37,072	3	4,191

	AUSTRIA-HUNGARY		DENMARK		FRANCE	
Year	No.	Tons	No.	Tons	No	Tons
1914	11	34,335	25	32,815	33	114,052
1915	No returns		23	45,198	6	25,102
1916	"	"	28	35,277	9	42,752
1917	"	"	23	20,445	6	18,828
1918	"	"	13	26,150	3	13,715
1919	"	"	46	37,766	34	32,663
1920	"	"	30	60,669	50	93,449
1921	"	"	37	77,238	65	210,663
1922	"	"	23	41,016	62	184,509
1923	"	"	24	49,479	27	96,644

	GERMANY		HOLLAND		ITALY	
Year	No	Tons	No.	Tons	No	Tons
1914	89	387,192	130	118,153	47	42,981
1915	.	201,000 [a]	120	113,075	30	22,132
1916	.	196,000 [a]	201	180,197	10	56,654
1917	...	65,000 [a]	146	148,779	17	38,906
1918	.	38,000 [a]	74	74,026	15	60,791
1919	.	135,000 [a]	100	137,086	32	32,713
1920	.	327,000 [a]	99	183,149	82	133,190
1921	242	509,064	98	232,402	85	164,748
1922	195	575,264	60	163,132	42	101,177
1923	117	358,273	35	65,632	21	66,523

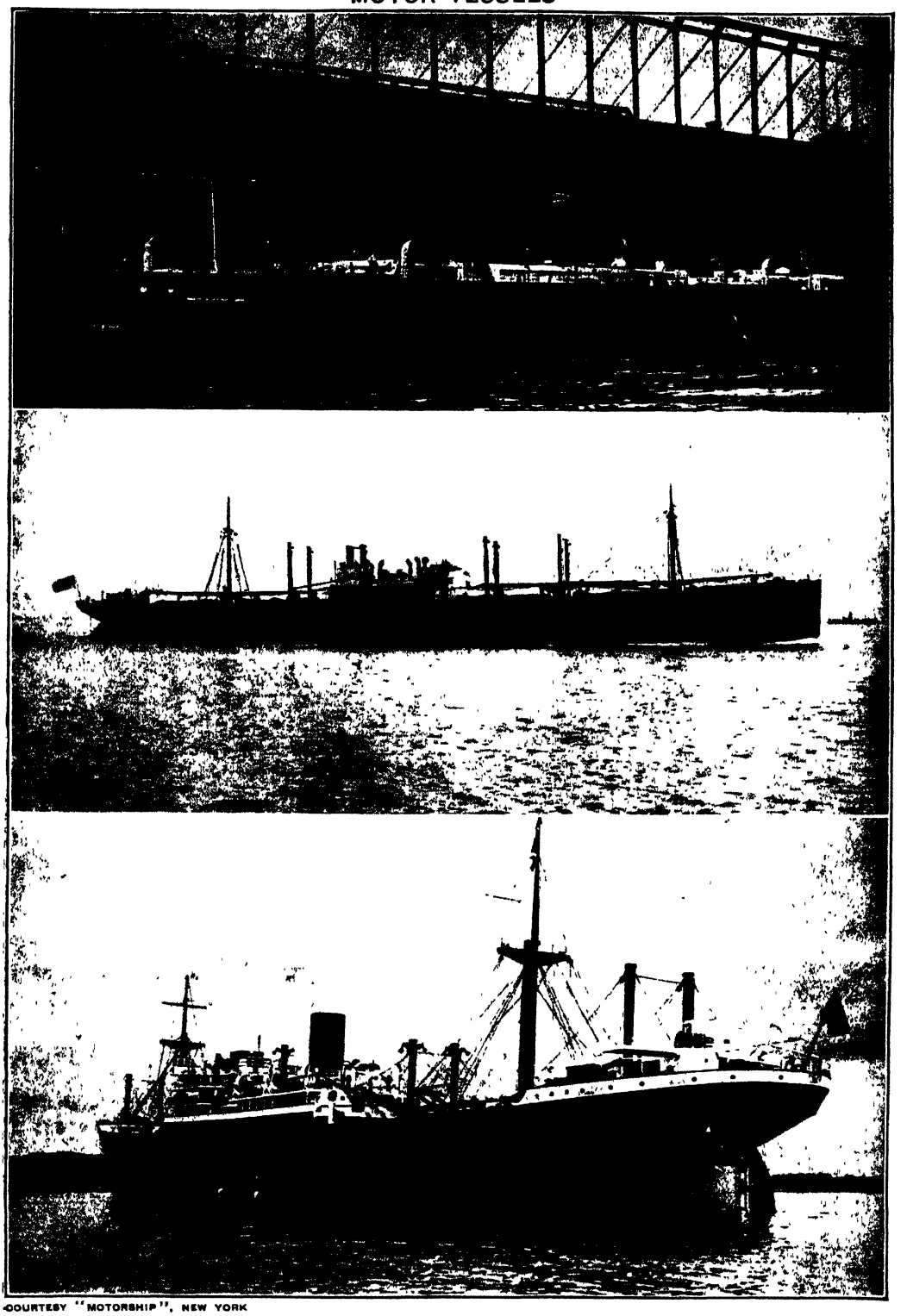
	JAPAN		NORWAY		SWEDEN	
Year	No.	Tons	No.	Tons	No	Tons
1914	32	85,861	61	54,204	26	15,163
1915	26	49,408	59	62,070	27	20,319
1916	55	145,624	52	42,458	34	26,769
1917	104	350,141	44	46,103	34	26,760
1918	198	489,924	51	47,723	36	39,583
1919	133	611,883	82	57,578	53	50,971
1920	140	456,642	30	38,855	46	63,823
1921	43	227,425	35	51,458	27	65,911
1922	49	83,419	23	32,391	14	30,038
1923	44	72,475	48	42,619	10	20,118

	UNITED STATES					
	Coast		Great Lakes		Total, U S	
Year	No	Tons	No.	Tons	No	Tons
1914	84	162,937	10	37,825	94	200,862
1915	76	157,167	8	20,293	84	177,460
1916	167	384,899	44	119,348	211	504,247
1917	266	821,115	60	176,804	326	997,919
1918	741	2,602,153	188	430,877	929	3,033,030
1919	852	3,579,826	199	495,559	1051	4,075,385
1920	467	2,348,725	42	127,528	509	2,476,253
1921	166	995,129	7	11,284	173	1,006,413
1922	55	97,161	4	21,977	59	119,138
1923	69	96,491	14	76,326	83	172,817

	OTHER COUNTRIES		WORLD TOTAL	
Year	No.	Tons	No	Tons
1914	35	36,148	1,319	2,852,753 [a]
1915	10	13,641	748	1,201,638 [a]
1916	18	14,296 [a]	964	1,688,080 [a]
1917	27	32,538 [a]	1,112	2,937,786 [a]
1918	40	34,478 [a]	1,866	5,447,444 [a]
1919	77	79,334 [a]	2,483	7,144,549 [a]
1920	52	96,368 [a]	1,759	5,861,666 [a]
1921	92	128,630	1,377	4,341,679
1922	51	43,154	852	2,467,084
1923	26	11,687	701	1,648,181

[a] Returns from Teutonic allies approximate only.

MOTOR VESSELS



COURTESY "MOTORSHIP", NEW YORK

1. MOTOR BARGE "TWIN PORTS," built for Lake, Canal, and River Service, Great Lakes to New York Harbor.
2. AMERICAN MOTOR SHIP "CALIFORNIAN," 16,500 tons displacement, 4500 I. H. P., speed 12 knots. Built by Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia.
3. BRITISH MOTOR SHIP "GLENOGLE," 12,500 tons displacement. Two Diesel Engines of 3000 I. H. P. Built by Harlan & Wolff, Belfast.

shipbuilding establishments had been turned into munitions works. In December, 1916, the Ministry of Shipping was established, and definite plans made to expedite building were carried into effect in 1917. Five types of "standard" ships of 3000 to 8000 tons were designed, and they were followed by "fabricated" ships for which new shipyards were built. These measures were fairly successful, but the lack of workmen kept down the output. Of the other nations, France and Italy were unable to speed up commercial work; this left the United States and Japan as the only countries, aside from Great Britain, which could materially aid in the supply of new ships.

Types of Ship. The necessity of rapid production during the War brought out some new types of cargo ships, such as fabricated ships, standard ships, welded ships, and concrete ships. The ideas involved were not new, but opportunity for their development on a large scale had not hitherto existed A few standard designs were made and many ships of each design constructed. The hulls, machinery, and fittings were exactly alike, so that scores of each plate, frame, casting, forging, etc., could be made at one time and place, thereby greatly reducing the cost, as in other sorts of standardization. Fabricated ships are standard ships in which the lines of the hull are simplified and straightened as far as practicable. This makes it possible for most of the frames and plates to be shaped, cut, and, to some extent, riveted in shops equipped for bridge and structural iron-work The reduced number of frame and plate shapes effected a great saving in labor and time, and some saving was made in riveting, shaping, and transportation. The Isherwood system is a system of longitudinal framing, i.e. one in which the longitudinal frames are continuous and the transverse frames worked in sections between them. Sir Joseph Isherwood devised a modification of the existing system in which was utilized the whole of the framing of the bottom of the ship and of the decks so that it might be incorporated as part of the structural girder strength of the ship. This system, first used in 1908, greatly increased in importance during the War, and 250 ships of nearly 2,500,000 tons were built in accordance with it in 1918. Welded ships are vessels in which welding is used to replace a great part of the riveting and some of the calking. While this had not yet become a popular method of ship construction in 1924, the experiments made were promising. Vessels of armored concrete had been in use for many years, and a number were built by the Shipping Board. As they were not very popular among shipping men and were not mentioned in late lists of the decade 1914–24, it is presumed that they were sold or otherwise disposed of.

Propelling Machinery. In cargo vessels designed to operate in those parts of the world where adequate repair shops are few and far between, the reciprocating steam engine was still in 1924 the favorite with owners who do not, for various reasons, find the Diesel engine suited to their work. Reciprocating engines had been in use for such a great length of time that perfection of the type in regard to reliability, simplicity, and ease of ordinary repair are strong points in their favor. But they lack economy of operation and have too great machinery weights and space, particularly in weight and space of fuel, as compared with engines of recent types. For vessels of moderate size and speed, particularly for those covering long routes, Diesel engines were becoming more and more popular. But in new passenger steamers of high and medium speed, the latter type carrying large cargoes, the geared steam turbine was almost invariably fitted, although a few such steamers had been ordered with new-type Diesel machinery.

Oil Fuel. The use of oil in place of coal as the fuel for marine boilers was being continually extended. Practically all new passenger steamers had oil-fired boilers. While the actual cost of oil fuel per ton mile is greater than that of coal, the economies effected by its use more than counterbalance this. The space occupied by the boilers is less. Oil can be carried by tanks located in spaces not suitable for cargo. The detestable work of coaling ship is avoided, and most of the necessary time and expense for that work is saved. The number of men in the boiler rooms is reduced by half. As oil fuel is 50 per cent more efficient than good steaming coal, the weight saved by its use, as well as the space, can be devoted to cargo or passengers. The principal objection to the use of oil was that in many ports of the world it was difficult to obtain. This objection was being largely obviated.

Turbines. In the early types of turbine engines, the turbines were directly connected to the propeller shafts. This necessitated low turbine speed or high propeller speed, neither arrangement economical. To enable the turbines to operate at their most efficient speed, which is high, and at the same time to drive propellers of the most desirable size and pitch at the proper speed, the turbines are fitted to deliver their power to the propeller shafts through gearing. Nearly all turbine machinery of late construction was of the geared type. The economical speed of the turbines is adjusted by the gears to the designed sea speed of the vessel; at lower speeds the economy is relatively less. The principal difficulty experienced with geared turbines is the pitting, wearing, and breaking of the gear teeth, and this increases with age.

Electric drive was devised to overcome the same difficulties connected with efficient turbine and propeller speeds that brought forth the geared turbine. The turbines drive electric generators furnishing current to motors on the propeller shafts. This arrangement permits of economical operation at all ordinary speeds, an important advantage in ships of war. For this and other reasons all recent battleships of the United States Navy and the large battle cruisers, which were scrapped by the Five Power Pact, were fitted with electric drive; but in light cruisers and smaller vessels, and in the merchant service, geared turbines are almost universally preferred.

Motor Ships and Diesel Engines. The most serious competitor of the geared turbine and indeed of all other types of steam propelling machinery is the heavy-oil internal-combustion engine of the Diesel or modified Diesel type. For machinery of 6000 horse power or less, it seems likely to at least divide popularity with the reciprocating engine. The earlier engines were mostly single-acting and of the four-stroke cycle type. Large four-stroke cycle double-acting engines of 10,000 brake horse power were

constructed in 1924. But recent great improvements in two-stroke cycle engines caused them to take the lead so that on Jan. 1, 1924, much more than half of all the motor ships building in Great Britain were of the two-stroke cycle type. To give greater mechanical simplicity and to reduce further the first cost of the propelling machinery, which had averaged about 10 per cent greater than steam equipment of the same power, double-acting two-stroke cycle engines with port scavenging were engaging the attention of designing engineers. A considerable number of ships equipped with such engines were in service in 1924, and many others were under construction. Another direction in which design was tending toward greater simplicity was the substitution of solid, or mechanical, injection of the fuel in place of air injection. In the quarter ending June 30, 1923, 52 steam vessels of 148,123 tons and 18 motor vessels of 90,515 tons were laid down in Great Britain and Ireland; in the same quarter, 6 steamers of 16,800 tons and 3 motor ships of 6000 tons were laid down in the United States; in all countries, 202,515 tons of steamers and 107,015 tons of motor ships. Since June 30, 1923, the proportion of motor ships laid down has still further increased. The United Shipping Board was removing the steam machinery and fitting Diesel engines in four comparatively new steamers and intended to transform about 50 others in the same way. The increasing demand for motor ships was causing many European owners to effect similar transformations. The largest motor ship laid down up to 1924 was the Union Castle passenger liner building at the yard of Harland and Wolff in Belfast, Ireland. The dimensions are: length, 630 feet; beam, 73 feet; tonnage (gross), 20,000. The propelling machinery consisted of two sets of double-acting, 8-cylinder Diesel engines of some 20,000 indicated horse power. The designed sea speed was 18 knots. See ELECTRIC SHIP PROPULSION.

SHIPMAN, SAMUEL (1883–). An American dramatist, born in New York City, and educated at Columbia University. He has written many popular plays, among the best-known being *East is West*, in collaboration with Aaron Hoffman, and *Friendly Enemies*. Others are: *Love and Art; A Social Outcast; A Spiritual Vulture; The Spell*, with Clara Lipman; *It Depends on the Woman; Royal Maid; Some Warriors; Elevating a Husband; Children of To-day; Flames and Embers; Head of the House; Sweethearts; The Good-for-nothing; Exemption*, with Clayton Hamilton; *The Kreutzer Sonata*, with Percival Wilde; *First is Last*, with John B. Hymer.

SHIPPING. The depressed financial condition of most European countries continued up to and through 1924 to affect adversely the shipping situation. During the last years of the War it was very generally expected that the great war losses and the small amount of construction in the first two years of the war period would bring about a shortage of shipping for several years after the close of hostilities. One of the principal arguments used by the German government to convince the Reichstag and the people at large of the desirability of the ruthless submarine campaign was based on this expectation, which would open new ways for German shipping. The anticipations in regard to shortage of shipping were not realized for two reasons: the reduced amount of maritime trade, and the heavy building of the United States, Great Britain, Germany, and Japan in the years 1917 to 1921, supplemented by the relatively large additions made to their merchant fleets by the less important countries during the same period. The United States added 11,000,000 tons to her overseas tonnage of 1914, and every one of the principal pre-war maritime nations, except Germany, Russia, and Austria-Hungary, added some thousands or millions of tons to their commercial fleets. The tonnages given in *Lloyd's Register* for July 1, 1914, and July 1, 1923, are shown in the Table A. Steam and motor vessels of less than 100 gross tons and sailing vessels of less than 100 net tons are excluded in all cases. For lack of satisfactory records all Japanese and most Greek (in 1923) sailing vessels are omitted: also wooden-hulled vessels of the United States engaged in trade in the Great Lakes.

TABLE A

SHOWING THE TOTAL TONNAGES OF VESSELS OF THE PRINCIPAL MARITIME COUNTRIES ON JULY 1, 1914, AND JULY 1, 1923

Nation	July 1, 1914	July 1, 1923
Great Britain and Dominions	21,045,049	22,058,112
United States	5,368,194	16,945,363
Germany	5,459,296	2,590,073
Norway	2,504,722	2,551,912
France	2,319,438	3,737,214
Japan	1,708,386	3,604,147
Italy	1,668,296	3,033,742
Netherlands	1,496,455	2,625,741
Sweden	1,118,086	1,207,727
Austria-Hungary	1,055,719	0
Russia	1,053,818	(†)
Spain	898,823	1,260,206
Greece	836,868	755,441
Denmark	820,181	996,862
Belgium	352,124	616,670
Other countries	1,384,097	3,182,993
Total, all countries	49,089,552	65,166,233

United States Merchant Marine, 1914–24. This was probably the most eventful decade in the history of American shipping. At its beginning, July 1, 1914, the tonnage in the foreign trade had declined to relative insignificance. This had been brought about by various antagonistic interests, foreign and domestic, by high wages in the shipping, shipbuilding, steel, and various other industries affecting the building and operation of ships, and by lack of interest in the question by Congress and the people at large. The combination of these numerous adverse factors was too great to be overcome without assistance by the government and by large commercial groups concerned in the foreign trade. Measured in dollars and cents it meant that the cost of operating a steamer under the American flag averaged about 6 per cent more than under the British and about 8 per cent more than under the Norwegian. The British freight lines, including steamers carrying passengers as a more or less subsidiary interest, were and in 1924 continued to be largely supported and controlled by great manufacturing, importing, exporting, and docking interests who found it advantageous to direct by their support the routes and terminals of transportation lines. By achieving this, the transportation lines became interested agents in finding and developing foreign markets for British goods and in securing foreign products for British import trade at the lowest rates, for the cheaper the goods the larger the volume of traffic. The Germans pursued similar methods and gave



BRITISH STEAMSHIP "MAJESTIC", WHITE STAR LINE

FORMER GERMAN "BISMARCK"

Gross Tonnage 56,551 Speed 26 knots

even more support and direction to their shipping, which was also carefully fostered by the government. The American merchant marine in the foreign trade had no such support as that given to the British and German fleets. Two-thirds of the exports up to 1914 were raw materials The American manufacturers have not made the same efforts as Great Britain and Germany to extend the sale of their products in foreign markets. Until they do so and take the same measures concerning the transportation of their wares, the maintenance of an extensive oversea merchant marine will be a difficult matter.

As early as 1913 the increasing export of manufactured articles and the reduction in cost of steel for shipbuilding began to have a favorable effect on the American shipping industry The outbreak of war gave a tremendous stimulus, which increased as the months rolled on. But in February, 1915, the Seamen's (La Follette) Act was a serious blow; in a few weeks it destroyed the American transpacific lines, which gave up attempting to continue their service, sold their vessels, and went out of business. (See UNITED STATES.) The demand for shipping began to increase soon after the outbreak of war At first, neutral shipping was preferred, but very soon the demand for tonnage swept everything into use, a result which German war methods would soon have achieved, for the danger to neutrals from mines and submarines was but little less than that to belligerents By the end of 1914, transatlantic freight rates had risen to four times pre-war figures, and they continued to advance in 1915 and 1916, in some instances to 15 times the pre-war normal. These conditions were brought about by (a) the internment, blockade, capture, and destruction of German, Austrian, Russian, Turkish, Rumanian, and Bulgarian shipping; (b) the diversion to naval use of a large percentage of Allied tonnage, the demand steadily increasing; (c) the loss of vessels from normal dangers of the sea and from submarine attack, submarine mines, etc.; (d) the transportation of food and munitions of war over long distances, from United States, Canada, the West Indies, South America, Australia, the East Indies, etc. Many American ship owners began at once to seize the opportunity to expand their holdings and to take advantage of the expected rise in freight rates. Many vessels were transferred from the coasting trade and enrolled for foreign service. A few shipping men took advantage of the already existing provision of the Panama Canal Act of 1912 which permitted the registry of foreign-built vessels not more than five years old American registry of such ships was still further facilitated by the Act of Congress of Aug. 18, 1914. In the fiscal year ending June 30, 1915, 147 vessels of 522,759 gross tons were thus transferred to the American flag and registered for the foreign trade

In many cases the transfers did not involve a change in the actual ownership, as they really belonged to American citizens or corporations but were operated under foreign flags for superior advantages thereby obtained Notwithstanding the enormous freight rates and the increasing demand for shipping, nowhere in the world was much new shipping laid down in the first year of the War. Germany, Austria, and Russia had no immediate use for shipping; England, France, and Italy, after May 23, 1915, were using their shipyards and their workmen chiefly in connection with war work, naval or military. The United States and Japan were the only other countries with extensive building yards and building facilities. New work was not undertaken in these countries until after June, 1915, because in the first year of hostilities it seemed to be the general opinion that the War could not last long on account of its enormous expense. By that time, however, it was seen that this war was as new in its methods of finance as in its size and its methods and that it might continue for years. The American and Japanese shipping interests began to order ships. At the same time British, Norwegian, and other foreign companies placed orders in the United States By the end of the year 700,000 tons of merchant shipping were under construction in American yards.

Shipping Act of 1916. Early in 1916 the Wilson administration proposed in Congress the creation of a great merchant marine under government control and operation. This was bitterly opposed by the great body of the Republicans and the more conservative Democrats. But as time went on and the need for shipping became more and more acute, it was seen that only by means of government assistance could the necessary vessels be supplied, so that on Sept. 7, 1916, after a long struggle in Congress, the so-called Shipping Act was passed and became a law. It is a much less comprehensive measure than the original bill. It established a Shipping Board of five members which was authorized to procure by purchase or construction cargo ships to the value of $50,000,000 and to set them at work, carrying American merchandise to foreign countries, and to regulate the rates and general business practices of the American merchant marine, much as is done by the Interstate Commerce Commission for land carriers Other powers of regulation and investigation were conferred.

Emergency Fleet Corporation. On Apr. 17, 1917, the Emergency Fleet Corporation was established under the provisions of the Shipping Board Act. This corporation was charged with the immediate duty of building up a large commercial marine of standard, fabricated, and other ships in the shortest possible space of time and under the most modern ideas of efficiency and economy in working, with speed of production as the primary object The first contract for new construction was let on Apr. 27, 1917. The demands of the Corporation were far beyond the capacity of the existing shipyards. In 1916 there were 66 yards, 27 of them for building wooden vessels only, in the United States; by the end of 1917 there were approximately 142 yards in which 1427 ships were building, of which more than 200 were wooden steamers of 2500 tons. The contracts for the wooden vessels were bitterly opposed and caused much friction between the members of the Shipping Board and those of the Fleet Corporation. As they were sold in 1922–23 for scrapping, the poor policy of their construction seemed proved

The Urgent Deficiency Bill, approved June 15, 1917, gave the President adequate power in placing orders for ships and ship materials and to take over for the use of the nation not only the output of the shipyards but the shipyards themselves. For several years the principal activities of the Shipping Board and Emergency Fleet Corporation were connected with the

building of ships. (See SHIPBUILDING AND NAVAL ARCHITECTURE.) After the close of the War, the Shipping Board endeavored to cancel all building contracts where cancellation could be effected without too great loss. Vessels were offered to American purchasers at low prices, and a considerable tonnage was sold Lines were established to various desirable points, and as far as possible these were subsequently turned over to commercial companies for operation.

The report of the United States Shipping Board, covering the activities of the board itself and of its subsidiary, the Emergency Fleet Corporation, shows that on June 30, 1923, the board owned 1325 steel vessels of 9,312,884 deadweight tons, of which 1187 vessels of 8,232,605 deadweight tons were cargo ships. In addition it owned 9 concrete vessels and 23 wooden vessels. On the same date there were 373 steamers of 3,172,498 deadweight tons in operation, handled by 42 managing agents and covering 78 services. There were laid up, therefore, 984 vessels of some 6,000,000 deadweight tons, or about 4,000,000 gross tons. The ships sold included 71 steel cargo ships aggregating 347,799 deadweight tons and realizing $8,725,372; 10 ships aggregating 64,911 deadweight tons were sold for conversion to Diesel motor ships and brought $564,500; and 44 steel tankers of 412,420 deadweight tons were sold for $18,875,004.90. In addition to these there were sold 8 old or damaged vessels, 13 ocean-going steel tugs, and 4 wooden tugs, while 233 wood and composite vessels, about 560,000 gross tons, were sold for scrapping.

The total merchant marine of the United States is analyzed in the following Table B showing the trade in which the ships were engaged, propulsive power, material of hull.

TABLE B

UNITED STATES MERCHANT MARINE, JUNE 30, 1923, SHOWING TRADE IN WHICH ENGAGED, TYPE OF VESSEL, MATERIAL OF HULL, ETC

	Registered (foreign trade)		Enrolled and licensed (Coast, rivers, etc.)	
Sail	No.	Gross tons	No	Gross tons
Wood	335	201,235	2,463	739,551
Metal	42	77,994	221	235,695
Total	377	279,229	2,684	975,246
Steam				
Wood	358	525,302	3,509	769,522
Metal	1,680	8,001,271	2,513	6,129,745
Total	2,038	8,526,573	6,022	6,899,267
Gas				
Wood	1,467	68,249	9,212	201,809
Metal	24	36,843	183	88,660
Total	1,491	105,092	9,395	290,469
Barges				
Canal—Wood			361	41,862
Wood	1,227	140,866	3,016	820,843
Metal	30	21,303	376	183,984
Total	1,257	162,169	3,392	1,004,827
Total registered	5,163	9,073,063	.	. . .
Total enrolled		.	21,854	9,211,671

Grand total 27,017 vessels 18,284,734 tons

TABLE C

UNITED STATES VESSELS AND TONNAGE ENGAGED IN THE FOREIGN TRADE, JUNE 30, 1914

Type	No	Gross tons
Steam	868	720,609
Sail	444	224,073
Barge	1,049	121,709
Total	2,361	1,066,391

In addition to the vessels added to American registry from other sources, the enemy vessels interned in 1914 in American harbors, including those of the Philippines, Porto Rico, and Hawaii, were seized and taken over by the United States government. The total tonnage of the 95 German vessels so acquired was 628,837. Among them were several of the largest and finest passenger steamers in the world, the *Leviathan*, formerly *Vaterland*, being actually the largest steamer then completed for service. There were 14 Austrian vessels interned in American ports in 1914, but 8 were sold to the Kerr Steamship Corporation before the United States declared war on Austria.

In Table D are shown the total tonnages of vessels, flying American and foreign flags, that entered and cleared in the foreign trade during the fiscal years 1914–23

TABLE D

	TOTAL TONNAGE		PER CENT	
	American	Foreign	American	Foreign
1914	27,470,703	79,101,283	26	74
1915	26,693,736	66,901,818	29	71
1916	35,829,742	68,143,163	34	66
1917	37,870,464	64,678,782	37	63
1918	38,489,763	52,980,156	42	58
1919	41,020,746	51,855,601	44	56
1920	55,239,879	53,253,160	51	49
1921	67,916,336	70,124,833	49	51
1922	59,756,486	63,159,285	48	52
1923	61,293,398	72,196,133	45	55

Merchant Marine Act. For half a century attempts have been made by the various presidents, members of Congress, and others who saw the desirability of having a large merchant marine in the foreign trade under the American flag, to assist in building it up and maintaining it by means of subsidies. With the exception of obtaining special payments for certain classes of mail steamers for the carriage of the mails, all these attempts failed. At the end of the War in Europe, the United States found itself in possession of an adequate marine, but owing to the greater cost of operating vessels under the American flag than under foreign flags it seemed probable that the new ships must be laid up or sold to foreigners unless some form of government assistance was forthcoming. Subsidy bills were introduced but failed to receive Congressional sanction In the Merchant Marine Act of June 5, 1920, known as the Jones law, which provided for the continuance of the United States Shipping Board and for other matters connected with shipping, there was a partial recognition of the principle of giving subsidies for the building and operation of American shipping. In Section 24 of this Act, limitations on the rates and other conditions of mail subsidies were removed, leaving the matter of compensation to the United States Shipping Board and the Postmaster General, within the appropriations made by Congress. In Section 11 of the Act, it was provided that there would be lent to shipowners to build new ships an amount not to exceed $25,000,000 a year for 5 years, derived from funds obtained by the sale of government-owned ships and receipts from their operation. Provision was also made for the establishment of certain experimental steamship lines to be operated by the Shipping Board until it was shown that they could not be made self-supporting. Section 23 permitted the earnings of American vessels to be exempted from excess profits taxes up to one-third the

cost of approved types of new ships to be built in American yards. Section 34 of the Act sought to remove any restriction on the United States to impose discriminating duties against foreign ships by terminating any articles in treaties or conventions in contravention of such action and directed the President to give 90 days' notice of such intention President Wilson declined to issue such notices or to take steps toward the abrogation of existing commercial treaties, on the ground that Congress had no constitutional right to authorize or direct such action. Section 28 of the Act restricts preferential export and import railroad rates to goods consigned to or by American vessels. A large part of the Act deals with ship mortgages; the purpose was to popularize shipping bonds by making a vessel mortgage a prior lien to that of material-men. See SHIPBUILDING AND NAVAL ARCHITECTURE; WAR IN EUROPE, BLOCKADE, SUBMARINE.

SHIPPING BOARD. See SHIPBUILDING, *United States;* UNITED STATES, *History.*

SHIPSTEAD, HENRIK (1881–). United States Senator from Minnesota, born at Burbank, Kandiyohi Co, Minn. He was educated at the State Normal School at St. Cloud, Minn., and at the dental school of Northwestern University, Chicago. He practiced dentistry at Glenwood, Minn, for several years, acted as mayor of the town one year, and was elected to the State Legislature of Minnesota in 1917. In 1920, he moved to Minneapolis, and was elected to the United States Senate by the Farmer-Labor party on Nov 7, 1922.

SHOES. See LEATHER; LYNN; BOOTS AND SHOES.

SHOOTING. See OLYMPIC GAMES.

SHOWERMAN, GRANT (1870–). An American philologist. He was born in Wisconsin and studied at the State university. He was in Rome as fellow of the Archæological Institute of the American School of Classical Studies (1898–1900) and on his return to the United States in the latter year became professor of classics at the University of Wisconsin. He is the author of *With the Professor* (1910); *The Indian Stream Republic and Luther Parker* (1915); *A Country Chronicle* (1916); *A Country Child* (1917). He translated Ovid's *Heroides et Amores* for Loeb's Classical Library (1914).

SHULL, AARON FRANKLIN (1881–) An American zoölogist born at Miami County, Ohio. He was educated at the University of Michigan and at Columbia. He was assistant in zoology (1905–08) at the University of Michigan; instructor (1911–12), assistant professor (1912–14), associate professor (1914–21), and professor (1921–) of zoology at the University of Michigan. He did important work on sex determination in rotifers and in insects, and was joint author (with Ruthven and La Rue) of *Principles of Animal Biology* (1920).

SIAM. An independent kingdom of southeast Asia; area 195,000 square miles; population in 1921, 9,221,000 as compared with 8,266,408 in 1910. Bangkok, the capital, had 628,675 inhabitants in 1919 (200,000 Chinese). Chinese coolie immigration arriving at Bangkok in 1921–22, a typical year, numbered 75,242; those emigrating numbered 46,777.

Industry and Trade. The life of the population centred, for the most part, in the rice fields. In 1922, of the 6,770,000 acres under cultivation, 6,490,000 were given up to rice. Cotton, tobacco, maize, and pepper received a limited attention. The economic well-being of the country was dependent on forces beyond its control. Drought often played havoc with the rice crops, while rice demands from Japan and competition from Indo-China and Burma, for instance, affected either favorably or adversely the Siamese market Thus, exports of rice (in metric tons) reached 1,193,230 in 1913–14, 281,960 in 1920–21 (because of drought); 1,270,535 in 1921–22; 1,275,198 in 1922–23. Of the mineral resources of tin, tungsten, coal, iron, zinc, manganese, antimony, the first received the greatest attention Production of tin was 1918–19, 8834 tons; 1919–20, 8542; 1920–21, 6201; 1921–22, 6249. The advance in foreign trade over the period 1914–24 may be gauged from the following imports and exports for 1913–14, $32,593,000 and $42,742,000; 1920–21, $60,298,000 and $29,310,000; 1921–22, $60,173,000 and $74,022,000, 1922–23, $57,498,000 and $64,525,000. (Conversions from the tical made at average annual rates of exchange). Principal items of export, 1922–23, were rice, $54,218,000; teak, $2,441,880; stocklac, $882,000, wood, other than teak, $605,300; tobacco, $571,200; salt fish, $516,880. Principal items of import, 1922–23, were manufactured articles, largely cotton goods, $36,038,400; foodstuffs, $8,079,050. metal manufactures, $4,769,140; wines and opium, $2,570,145. Trade continued to be carried on largely with Hongkong, Singapore, China, India, the United Kingdom During the period after the War intercourse with the United States increased, imports in 1921 reaching $1,958,706, but dropping to $798,540 in 1923. Railway building was considerable during 1914–24, so that mileage increased from 976 in 1915 to 1485 in 1923. Work was under way on extensions out of Kovat, and from Petrin to Aran Pratet Through service from Bangkok to Penang was inaugurated in 1922, and a similar service to Chiengmai was planned. The whole railway system was being converted to the meter gauge. Wireless stations were erected at Bangkok and Senggora.

Government and History. There was no change in the structural form of government and the king remained the absolute ruler The revenues increased from $27,527,882 in 1913–14 to $31,508,990 in 1921–22; expenditures from $23,391,510 in 1913–14 to $33,223,200; extraordinary expenditures against capital account from $5,634,360 to $6,944,990. The national debt at the end of 1914 stood at $30,410,960, in March, 1923, it was $46,279,046. The rise in the price of silver compelled the government in 1919 to change the value of the tical from 13 to the pound ($0.37) to 12 to the pound ($0.405), but back again to the normal rate in January, 1923 In 1922, it was worth $0.47; from Jan. 3, 1923 on the bank selling rate on the United States remained at $0.406. Under King Rama VI progress was continuous, particularly in the fields of sanitation, law, municipal functions, etc. On July 22, 1917, Siam declared war on the Central Powers and sent an ambulance detachment to the western front late in 1918. As an Associated Power Siam had delegates at the Peace Conference and became a member of the League of Nations. Thus politically, but as well economically, with the passing of Germany the British influence became paramount in the country after the War.

SIBERIA AND FAR EASTERN REPUBLIC. Although commonly taken to embrace all of Russia in Asia, exclusive of the Central Asiatic provinces of Kirghizia and Turkestan, the geographical name Siberia properly applies only to the territory east of Lake Baikal and the Yakutsk territory of eastern Siberia, while the territory to the east of Yablonoi mountain ridge and to the south of Stanovoi mountain ridge, bordering on the Pacific Ocean, is known as the Far East. The territory of western Siberia comprises 2,209,660 square miles, with a population, according to the census of 1920, of 9,040,500 souls, as against 7,286,100 in 1914. The Yakutsk province, in Eastern Siberia, at present known as the Yakutsk Autonomous Socialist Soviet Republic, represents a vast expanse of practically uninhabited timber land and frozen marshes, covering 1,457,070 square miles, with a total population in 1920 of but 266,500 souls, as against 311,300 in 1914. The territory of the Far East, at present known as the Far Eastern Soviet Republic, including Sakhalin, has an area of 998,000 square miles, with a population of 1,624,700 souls, as against about 1,601,000 in 1914. Grand total: area, 4,664,730 square miles; population, 10,931,700.

Western Siberia, which is part of the Russian Socialist Soviet Republic, is bounded on the east by the Yukutsk Republic and Lake Baikal, on the south by the Kirghiz Republic and Tchungaria, on the west by the Ural Mountains, and on the north by the Arctic Ocean. It comprises the provinces of Altai, Yenisei, Irkutsk, Novo Nikolaevsk, Omsk, Tomsk, Tumen and the autonomous territory of Oyrat. With the density of population averaging only 2.23 souls per square mile (as against an average of 35 5 per square mile in the United States), it would appear that a great opportunity would exist for colonizing. The immense territory, however, was for the most part devoid of agricultural importance, and all the land suitable for habitation and settlement had practically been taken up. The agricultural zone of Siberia did not extend northward beyond the 58–59th parallel and represented a belt of about 450 miles in width and 1600 miles from east to west, constituting a continuation of the "black soil" belt of European Russia. The best and most thickly populated arable lands were situated along the path of the Trans-Siberian railroad, branching off through the valleys of the rivers and extending southward to the Chinese boundary. The total surveyed land area of western Siberia amounted to but 140,400,000 acres, or less than 10 per cent of the entire territory. The greater part of this surveyed territory was covered with forests, interspersed by vast expanses of marshes, and only 8,100,000 acres were estimated, according to the rural census of 1923, to be fit for settlement, of which area two-thirds would require heavy pioneer work. With the elimination of uninhabited territory, the density of Siberian population rises to about 9 per square mile, approaching that of Colorado (9.1), and North Dakota (9.2). The density of the population in the southern part of Siberia was estimated as high as 20 to 25 persons per square mile, or approximating that of Kansas (21.6), California (22), or Maine (25.7). If the territory is further reduced to the surveyed land only, which amounts, as above stated, to 140,400,000 acres in the six principal provinces, with a total population of 6,681,000 souls, an average of 30.4 persons per square mile would be arrived at. Of the above total acreage of surveyed lands, arable land, including prairies, amounted to 44.8 per cent; meadows, 8; pastures, 11.6; timber, 17.1; and under water, marshes, etc., 18.5.

According to the census of 1923 there were in western Siberia 3,010,000 head of horses, 3,641,074 head of large horned cattle, 6,200,800 sheep, 54,447,000 goats, and 877,107 swine. In 1917, the live stock of the average Siberian farmstead amounted to 2.5 draft horses, 3.2 of horned cattle, including 1.9 milch cows, 4.1 sheep and 1.5 swine. In 1922, the average equipment fell to 1.6 draft horses, 2.2 horned cattle, including 1.2 milch cows, 3.2 sheep and 0.5 swine. The Siberian horse, generally small, further deteriorated as a draft animal. The number of horses below 12 hands in height rose to 90 per cent of the total equine stock; the average weight of cattle on the hoof comparative with pre-war decreased from 578 pounds to 506 pounds, and the annual yield of milk per cow decreased by 20 per cent. Industrial enterprises under the jurisdiction of the (Soviet) Bureau of Siberian Industries numbered 695 and employed 44,236 workmen. Of this aggregate, 233 (33 per cent) were at a standstill. The majority of the bigger plants—299, or 43 per cent of the total number of establishments—were being operated by the state, employing 41,140 (93.2 per cent) of the total number of workmen. Leased enterprises represent 23.4 per cent of the total, with 4.3 per cent of the employees. Besides the coal and gold mining industries, the state operated 28 tanneries, 59 woodworking establishments (of which 28 were at a standstill), 5 heavy-woolen cloth mills, 1 flax-spinning mill, 1 cotton-wadding factory, 8 felt-boot factories, 23 alcohol distilleries (of which only 6 were included in the operating programme for 1923), 4 metallurgical plants, 20 metal-working shops, 4 glass factories, 1 porcelain factory, 3 match factories, 4 oilseed-crushing mills, etc. Of the state industries, 171 (57 per cent) were combined in "trusts," embracing chiefly the mining industries. Coal mining ranked first among the industries, employing 17,290 (39.1 per cent) of the labor. Gold mining stood second, with 6015 workmen, or 13.59 per cent of the total. Next in order followed the leather industry, with 3352 workmen (7.57 per cent); woodworking, with 3116 (5 94 per cent); and metal-working, with 2468 (3.75 per cent). The output of coal for the operating year 1922–23 amounted to 1,350,000 long tons, representing 96 per cent of pre-war production. The increase in coal production was attributed to the development of the "Kuzbas" region (Kuznetzki Basin), where the output exceeded that of 1914. It must be noted, however, that the development of the vast resources of the Kuznetzki Basin had hardly begun in 1914. Only surveying and preliminary excavation were carried out in that year, in the course of which there were mined about 3,000,000 poods of coal (about 48,000 long tons).

Far East. The Far Eastern Republic, which prior to 1922 was detached and politically independent of the Soviet régime, was gradually subjugated and absorbed by the latter. Soviet troops aided in the overpowering of the White government of the Maritime Republic in the fall of 1922, with the result that the Far Eastern Republic and the Maritime Republic were

consolidated into one and affiliated with the Union of Socialist Soviet Republics. As constituted in 1924, the Far Eastern Republic comprised Transbaikal, Amur, Maritime and Kamtchatka provinces, as well as Sakhalin. It was bounded by the Pacific Ocean and the Seas of Okhotsk and Japan on the east, the Arctic Ocean on the north, the Yakutsk Autonomous Republic on the west, Korea, China, Manchuria, and Mongolia on the south. Of the total area of 998,000 square miles, approximately 350,000 miles were covered by timber. The remaining territory was not yet thoroughly explored but roughly 54,000,000 acres were suitable for agriculture in one form or another, of which only 4,797,000 acres, or only 8.88 per cent of the total, constituted arable land. According to the rural census of 1923, the total population, including Kamtchatka, numbered 1,624,700, of vhich 1,284,800 were rural The area under cultivation reached its greatest extent in 1917, namely, 3,202,400 acres. By 1922 it fell, owing to disorganization and civil strife, to 1,711,000 acres. But, after annexation to Soviet Russia and political settlement, the sown area began increasing again, and in 1923 amounted to 2,001,000 acres. The total number of farmsteads registered was 214,461, with the following average personnel and equipment. number of mouths per farmstead, 5.45; field acreage, 15.8 acres; meadows, 6 67 acres; horses, 2.4 head; horned cattle, 3.6 head; sheep and goats, 2.5 head; swine, 1.37 head; machinery and equipment, 140 rubles' worth, at pre-war prices.

Agriculture throughout Siberia was characterized by the practical absence of winter sowings, all cereals being spring sown, and the prevalence of grain over other plants. In 1923, of the 2,001,000 acres planted in the Far East, 36.5 per cent was to spring wheat; 13.6 per cent to spring rye; 28.6 per cent to oats; and the balance of 21.3 per cent to other plants, chiefly soya beans, rice, flax and sunflower The soil and climatic conditions of this region favored the development of such technical plants as flax and oilseeds Average crops of cereals for the 10 years 1913–23 showed· wheat, 27 bushels; rye, 27.95 bushels; oats, 62 15 bushels Principal industries of the Far East were hunting fur animals, deep-sea fisheries, forestry and coal mining. According to the latest data of 1923, the total timber area of the Far East was about 222,450,300 acres. Of this territory, good timber stands were estimated at 123,357,600 acres, or 55 per cent of total. By comparison with pre-war data, which estimated the total area within the same boundaries at 116,000,000 dessiatines (313,200,000 acres) and of good timber stands at 83,000,000 dessiatines (224,100,000 acres), it was evident that the earlier figures were greatly exaggerated The distribution by administrative divisions of the 1923 data was given as follows:

Provinces	Total area	Total timber area (In acres)	Good forest land
Maritime	135,945,000	86,994,000	52,768,800
Sakhalin Island	8,496,900	6,750,000	4,212,000
Amur	99,079,200	57,304,800	30,601,800
Transbaikal ...	74,007,000	57,145,500	28,647,000
Kamtchatka ...	321,067,800	14,256,000	7,128,000
Total	638,595,900	222,450,300	123,357,600

The coastline of the Far Eastern Republic has a length of 11,930 miles, comprising the great fisheries of the Okhotsk, Japan, and Behring Seas. These waters were remarkable for the great variety of fish inhabiting them. Thus, in the Behring Sea 165 distinct species of fish were caught. The principal species of commercial value in the Far East were salmon, herring, codfish, sturgeon, and flounder. The whaling and seal-hunting industries were also largely developed, although whaling was not organized until 1923, when a whaling concession was, for the first time, granted by the Soviet government to a Norwegian, Mr. Christiansen. According to the data of a commission despatched to Commodore Islands in 1923, the seal herds of the Commodore Islands were estimated at 14,000 to 15,000 head, and of beavers at 250,000. In 1923, 269 fishing sectors had been leased by the Soviet government to Japanese concerns, for an aggregate rental of 1,162,000 rubles, in addition to payment on account of arrears of 1,000,000 rubles. The total catch of all kinds of fish in Far Eastern waters averaged about 193,550 tons, salmon amounting to about 100,000,000 pieces, or 160,000–170,000 tons and herring to 161,300 tons, of which western Kamtchatka yielded 54 per cent, eastern Kamtchatka 15 per cent, the Amur River 25 per cent, Okhotsk and Sakhalin district 10 per cent, and Sea of Japan 1 per cent. The Far East was rich in coal deposits, of which those of black coal were estimated at 2,305,000,000 tons, and lignite at 560,000,000 tons. At the end of 1923 six coal mining enterprises were exploited by the state and 14 were leased, chiefly in the Maritime province. The total production in 1923, exclusive of the Russian part of Sakhalin, which was occupied by Japan, by virtue of Japanese claims for the Nikolaevsk massacre, was represented as follows·

	Black coal	Brown coal (In tons)	Total
State coal mining enterprises ..	10,721,000	22,312,000	33,033,000
Leased coal mining enterprises . .	2,482,000	10,227,000	12,709,000
Total	13,203,000	32,539,000	45,742,000

History. Immediately after the Russo-Japanese War of 1904–05, a rapprochement took place between Russia and Japan. In a series of four secret treaties most of which were not made public until the time of the Washington Conference, the two powers allocated each other their respective zones of interest in the Far East and agreed on friendly coöperation in Far Eastern affairs The fourth and last of these treaties, which was first published by authority of Trotsky in 1917, was concluded on July 3, 1916, and provided for what amounted to an alliance between Russia and Japan. It was contemporary with an open agreement by which the two powers bound themselves to coöperate in the regions which hitherto had been the bone of contention between them. Thus the former enemies had in the darkness of secret diplomacy taken definite steps for the prevention of future conflict over eastern Siberia and for a joint imperialistic policy in China to the prejudice of the interests of all other powers But hardly had this policy matured when the Russian Revolution annulled the four secret treaties and provided Japan with a pretext and an opportunity to pursue a course of its own in the Far East.

A new chapter in the history of Siberia opened when the decision was reached in the summer of 1918 for Allied intervention in Siberia. The conclusion of peace between Soviet Russia and the Central Powers closed Russia proper to the Allies and thus there remained to them Vladivostok, the back door, as the only possible entrance to render aid to those Russian elements which were still eager to continue the war against the Central Powers. The Allies were also anxious to prevent the large military stores in Vladivostok and along the Siberian Railroad from falling into the hands of the enemy. An additional reason for the despatch of the Expeditionary Force was the desire to aid the Czecho-Slovak Legion which had been slowly and laboriously fighting its way to the Pacific in order to proceed to France, and which had come in conflict in Siberia with the Bolshevists and the armed German and Austrian prisoners. These were the reasons advanced by the United States in an official announcement of Aug. 3, 1918, for its participation in the venture, and there is no ground to doubt the sincerity of the American government. How far more selfish motives, and particularly the desire to crush Bolshevism, entered into the reasoning of the other participants is a different matter. At any rate, Japan, as became apparent from its subsequent action, aimed at the exclusion of Bolshevism and Russia from the Far East and at the extension of her own political and economic power to eastern Siberia, and had concluded already on May 16, 1918, a treaty with China to this effect, although officially it proclaimed to be actuated by the same motives as the United States.

Meanwhile a rather confused situation had arisen in the interior of Siberia. Early attempts on the part of the Bolshevists to spread their power to Siberia were only partially successful and were blocked during 1918 by the Czecho-Slovaks and the anti-Bolshevik organizations of various descriptions which sprang up during the course of the year. The confusion was still further increased by the independent action of the Japanese who landed troops at Vladivostok in the spring of 1918 and thereby began their policy of fishing in the troubled Siberian waters. During the summer the Allied Expeditionary Force arrived and at the same time the Japanese advanced along the Siberian Railway. Thus there were active over the vast extent of the Siberian territory an incoherent combination of forces and movements each one of which was, with the exception of the common opposition to the Soviet government, actuated by different motives. At the end of 1918, Admiral Kolchak succeeded in uniting the many counter-revolutionary groups into a rather loose organization which established its headquarters at Omsk in western Siberia. After the elimination of the moderate Socialists and the liberal elements through a coup d'état, the Omsk government adopted openly a policy of monarchist reaction. The reactionary and military character and the administrative inefficiency of the Kolchak government and particularly the predatory raids of such ruthless anti-Bolshevik condottieri as the Cossack Attamans Semenov, Ungern-Sternberg, and Kalmikoff, who recognized only nominally the authority of Kolchak, served to discredit the entire anti-Bolshevik movement with the mass of the Siberian people. The initial support which the counter-revolutionists received from the native population was further weakened by the fact that they were backed by foreign troops operating on Russian soil and especially by the Japanese, whose selfish aims became more and more evident. The number of Japanese troops in Siberia was temporarily reduced as a result of the protest of the American government on Nov 2, 1918. The United States, on the other hand, which was the only foreign government that in a measure held the confidence of the Siberian people, refused to enlarge its action into military support of the West Siberian government, in spite of urgent recommendations of the chief American representatives in Siberia in favor of such procedure. Also the Japanese, who acted from ulterior motives and who had no interests west of Lake Baikal, refused to make such a move and preferred to pursue a policy of their own by tightening their hold on Eastern Siberia The military position of Kolchak became in consequence more and more precarious and was further aggravated by the action of General Semenov, who sat astride the Trans-Siberian Railway at Chita and held up at will Kolchak's supply trains. At the same time the policy of reaction at Omsk went its course and succeeded in alienating completely the sympathies of the Siberian population. After initial military successes during 1919, the Kolchak All-Russian Movement succumbed to the Bolshevists at the end of the year, a victim of its own folly and of the lethargy or selfishness of the Allies who ostensibly had moved into Siberia to assist the Russians in the formation of a representative government This débâcle was followed in February, 1920, by the withdrawal of the American Expeditionary Force and the abandonment by the United States of a Siberian policy which had been a sterile adventure from the start. The Japanese, however, who were in Siberia for reasons of their own, remained and consolidated their powerful position. They issued a statement on Mar. 31, 1920, to the effect that "the presence of the Japanese forces in the Russian Far East does not imply any political designs against Russia and . . . as soon as the political situation in the Russian Far East has become normal to the extent that there will be no danger to Korea and Manchuria, and life and property of all our nationals protected and normal railway communications restored, that then, after the evacuation of the Czecho-Slovak forces has been completed, our troops will be withdrawn from Siberia as early as possible." This statement was followed in April of the same year by an attack of the Japanese troops on the local Russian forces and by the Japanese occupation of the entire Maritime Province. A weak anti-Bolshevik government led for a time in this region a precarious and ignominious existence as a tool of the Japanese.

After the fall of the All-Russian government Siberia lapsed once more into utter chaos, but the Bolshevists advancing from the line of the Trans-Siberian Railroad gradually established their authority in the greater part of the country. At Irkutsk the Western Siberian Revolutionary Committee sprang up, which assumed control and governed under direction from Moscow. Local opposition in Eastern Siberia to the Committee gave birth to the Far Eastern Republic which gradually took over control in practically the entire region east of Lake Baikal. The republic was nominally an independent state but in reality it maintained close connec-

tion with the Soviet government. In spite of this relationship, however, which existed primarily in the foreign policy of the two states, the Far Eastern Republic was not organized along Soviet lines, but on the basis of radical democracy. While private property was abolished the constitution of the new state contained a bill of rights and the Legislature was elected by the universal franchise of all the people. In short, the fundamental principle of the Soviet doctrine, namely the dictatorship of the proletariat, was not applied But it was obvious from the beginning that the Far Eastern Republic was merely a transitional organization and was created to serve as a "buffer" state between Soviet Russia and Japan. This became very evident from its strongly anti-Japanese policy and from its vigorous action against the counter-revolutionary elements, which were still operating within its territory or on its frontiers. In October, 1920, its forces expelled Semenov from Chita, whereupon that city became the capital of the new state.

In consequence of the successes of the Far Eastern Republic, the Japanese opened negotiations with representatives of this state and the Soviet government during 1920, which resulted in the definition of the frontiers between the territory of the Chita government and the Japanese zone Meanwhile new complications arose, because of the Japanese occupation of the northern half of Sakhalin and of parts of Kamchatka, ostensibly in reprisal for the massacre of Japanese troops at Nikolaevsk. In the early part of 1921 the Chita government called on Japan to withdraw from the remainder of the Siberian territory and pointed to the Japanese pledges in this respect. When this action produced no results more vigorous notes were directed to the Japanese government, while at the same time representations were made to the United States in which attention was drawn to the fact that the presence of Japanese troops in Siberia was a direct result of the invitation on the part of the United States to the Japanese government for intervention in Siberia and the claim was advanced that therefore the American government was morally responsible for the existing situation. This protest came simultaneously with a strong note from the Washington government to Japan. The United States had grown apprehensive as to the intentions of the Japanese in Siberia and gave warning that Japan's policy might lead to her isolation in Far Eastern affairs. Japan, however, evaded a direct settlement of the issue by inviting the Far Eastern Republic to a conference. Negotiations were begun in September, 1921, at the conference of Dairen, which dragged out till April, 1922, without producing any results. Meanwhile the Far Eastern Republic was unofficially represented at the Conference of Washington There the Siberian question came up, but was shelved after lengthy discussions. This Conference, however, had the indirect result of convincing the Japanese that a policy of closer adherence to international coöperation would be more productive than a policy dictated by national egotism. This consideration, together with reasons of domestic policy, induced the Japanese government, in the summer of 1922, following a proposal of the Far Eastern Republic for renewed negotiations, to express its willingness to evacuate the Siberian mainland by the end of October of the same year. A new conference took place in September, 1922, at Changchun in Manchuria, at which Soviet Russia was officially represented through Joffe, its envoy to China After some minor agreements the conference broke up because Japan was yet unwilling to deal directly with the Soviets. In conformity with its pledge, the Tokyo government withdrew its troops from the mainland in October, but the northern half of the island of Sakhalin remained under Japanese military occupation.

From the very start, the connection between the Far Eastern Republic and the Soviet government had been close and this intimate relationship grew in proportion to the consolidation of the position of the Chita government, to the freeing of Siberian soil from foreign troops and from counter-revolutionists, and to the crystallization of a Soviet Far Eastern policy, especially with regard to China. In December, 1920, a treaty had been signed between the Far Eastern Republic and Soviet Russia whereby Kamchatka was ceded to Moscow. At the same time Communism came more and more to the fore in the inner political life of the Far Eastern Republic and tended to submerge the original democratic principles. The Communists obtained gradually a majority in the National Assembly at Chita and the Far Eastern Republic became for all practical purposes a part of the great Soviet organization. With the evacuation of the Maritime Province by Japan, all of the former Asiatic domains of the Czar were in the hands of revolutionary Russia and there was no raison d'être for the Chita "buffer" state. The Far Eastern Republic having fulfilled its purpose was liquidated on Nov. 13, 1922, when the Chita National Assembly voted to turn over all power to a Revolutionary Committee which operated as part of the Soviet government. The undisputed authority of the Moscow government stretched now, as far as governmental authority goes in the vast, thinly populated, and undeveloped territory of Siberia, from the Ural Mountains to the Pacific Coast.

The history of Siberia became thereafter wholly part of the history of Soviet Russia. Soviet Far Eastern policy included in the succeeding years primarily negotiations with China concerning Mongolia and Manchuria and with Japan concerning the northern half of Sakhalin In the case of China steady progress was made in the course of lengthy and arduous negotiations toward a closer relationship. As for relations with Japan, there was also a turn rather satisfactory to Moscow. While still continuing her occupation of northern Sakhalin, Japan gave a definite pledge for the early evacuation of that territory. In the summer of 1924, more or less authentic reports were current to the effect that Soviet Russia and Japan had reached or were approaching an agreement for closer cooperation of the two states in Far Eastern affairs to the exclusion of all other powers. If sufficiently substantiated, these reports would mean that Moscow and Tokyo had reached that point of alliance and joint action in opposition to the interests of the Western Powers which was attained by the governments of the Czar and the Mikado at the time when the Revolution occurred and threw Far Eastern affairs into complete turmoil.

SIDIS, Boris. See Psychology, Abnormal.

SIERRA LEONE. A British colony and protectorate on the west coast of Africa between

French Guinea and Liberia. Area of colony, about 4000 square miles; population in 1921, 85,-163 of whom 1161 were Europeans. In 1911, the population was 75,572, of whom 702 were Europeans. Freetown, the chief town, had 44,-142 inhabitants in 1921, as compared with 34,-090 in 1911. The protectorate has an area of 27,000 square miles and a population (1921) of 1,456,148. The colony and protectorate continued to depend upon the export of palm kernels and kola nuts, which formed 87 per cent of the domestic exports. Other exports were palm oil, piassava, and rice. Exports in 1913 totaled £1,731,252; in 1920, £2,949,380; in 1922, £1,372,862. Imports, consisting of manufactured goods, food, drink, tobacco, and coal, totaled £1,750,303 in 1913; in 1920, £3,548,478; in 1922, £1,511,496. Of total imports in 1922, the United Kingdom furnished 71 per cent; United States, 11 per cent; West African possessions, 6 per cent. Of total exports in 1922, the United Kingdom received 69 per cent; the United States, 1.5 per cent; West African countries, the remainder. The important place that Germany occupied in the colony's export trade —it took most of the palm kernels—was taken by the United Kingdom and the United States. That the colony's position in 1922 was not much better than that of 1913, was reflected in the tonnage figures. In 1913, 2,931,085 entered and cleared; in 1922, 2,474,226 tons. Revenues and expenditures showed some increase over 1913–23. Revenues for 1913 and 1923 were £618,383 and £845,319; expenditures for the same years were £622,439 and £727,661. The public debt on Jan. 1, 1923, amounted to £1,729,-848. After 1912, the railway from Boia Junction was extended to Kamabai (104 miles). The natives gave excellent assistance to Great Britain during the War and aided in the reduction of Kamerun. Their dependence for foodstuffs completely upon importations led to want after the War because of prevailing high prices.

SILESIA. See CZECHO-SLOVAKIA.

SILESIA, UPPER. This region (area 3230 square miles) was the seat of a bitter conflict in the years 1919–21. The population is mixed, according to the German census of 1910, there being 1,258,186 inhabitants of Polish extraction and 884,045 Germans. Because of this preponderance of Polish nationals, the Poles, championed by the French, strongly pressed before the Peace Conference their claims for annexation of the whole region. There was an economic factor, however, not to be disregarded. The region was responsible for one-fifth of Germany's total coal production. The vast coal basin, stretching from Oppeln south and east into Teschen and Galicia, by 1913 had produced 45,000,000 tons of coal. Besides, great iron fields, as well as zinc and lead deposits, contributed to make the section one of the most important industrial centres of central Europe. Here were located the important towns of Beuthen, Gleiwitz, Oppeln, Konigshütte and Ratibor, in which Polish laborers found plentiful employment. By the decision of the Peace Conference the region was constituted a plebiscite area and an inter-Allied commission was provided for and granted police powers. From February, 1920, until the final disposition of the region (October, 1921), the whole of Upper Silesia was in a ferment. The importance of the territory for both contestants and the bitterness that characterized every insignificant move attracted international attention. By the French and Poles Germans were accused of colonizing the area; the Allied Commission, on the other hand, was charged by Germans with showing partiality toward the Poles and permitting them to intimidate inhabitants in the southern and eastern districts. A course of terrorization during 1920 was systematically pursued by the Poles; voters were kept from balloting, were beaten, and sometimes killed. Non-residents were refused passage across the frontier. On Mar. 20, 1921, the plebiscite was taken. The count showed 717,122 votes for Germany and 483,514 for Poland. In the chief industrial centres the vote was preponderantly German. As the division of the territory came up for consideration before the inter-Allied Commission, the disorders increased. The French representative, who had consistently championed the Polish cause, favored the cession of the whole of the southern and eastern sections, i.e. the industrial areas, to Poland. This the representatives of Great Britain and Italy refused to countenance, with the result that affairs dragged as protracted negotiations were carried on by the home governments. Polish patriots aware of this dissension collected a large force and virtually possessed the districts under dispute. Meanwhile, Germans had rushed to the defense of their compatriots, with the result that fighting took place around Ratibor and Cross-Strehlitz. In May, 1921, M. Korfanty, Polish high commissioner, erected a government in the southeast. Not until Allied troops were despatched in June, 1921, did some semblance of order appear. On June 26, a truce was established, though the Polish troops shook off control, turned brigands, and terrorized the German populations.

The impasse caused by the irreconcilability of the rival demands finally prompted the Supreme Council to turn over adjudication to the League of Nations, August 12. A commission made up of representatives of Japan, Brazil, China, Spain, and Belgium, reported on October 20. The report, as accepted by the League Council, virtually conceded all of Poland's claims. The southern and eastern districts, constituting an area of 1240 square miles, with a population of 891,669, were turned over to Poland. The new boundary, running from Oderberg in the south along the Oder River northwest to a point a little below Ratibor, thence northeast to Beuthen, thence northwest to a point west of Lublinitz and finally northeast again to Lissau, gave to Poland the greater share of the so-called Industrial Triangle containing four-fifths of the coal production and nearly all the metallurgical plants, viz., half of the county of Zabrze, all of the county of Kattowitz, and a little more than half of the counties of Beuthen and Königshütte. Something of the nature of the division may be seen in the fact that of the 67 collieries in operation in Upper Silesia, 47 were allocated to Poland. These mines, in 1920, had produced 31,-750,000 metric tons, of which the 47 mines falling to Poland were credited with a production of 23,763,740 metric tons. In the territory allotted to Poland, 510,000 votes had been cast in the plebiscite, of which 285,000 had been for Poland and 222,000 for Germany. As a rule, German votes had been in a majority in the cities. Because the industrial life of the whole region would be dislocated if boundary lines were drawn immediately, the League Council provided

a body of administrative regulations. All of Upper Silesia, for 15 years, was to be under the supervision of a mixed commission of Poles and Germans. Railways were to continue in operation under their old concessions and rates were to be uniform. The existing systems of water supply were to be continued. The German mark was to remain the legal tender in the plebiscite area over the whole 15-year period. Though the German and Polish customs laws were to apply forthwith at the new frontier, natural products coming from one of the two zones and destined for consumption in the other were to cross the frontier duty-free. The same was to be true for unfinished products needing completion. For 15 years Poland was to permit exportation into Germany of any of the mineral products in the Polish zone, and Germany was to reciprocate. Property rights were to be respected as well as the rights of minorities. On Oct 27, 1921, the German government informed the Council of Ambassadors of its willingness to accept the League's decision, though it protested against the unfairness of the division of territory. During June and July, 1922, the inter-Allied forces evacuated the region, and were replaced by Poles and Germans. The Germans proceeded in September, in their zone, to hold an election on the question of home rule as against continuance as a province in the Prussian state. By a vote of almost ten to one, the decision favored the erection of a self-governing state. The Poles, on their part, divided Polish Upper Silesia, together with Teschen, into three electoral districts for elections to the Polish parliament. Silesia having received local autonomy, elections were held on September 24 for the new county council and the first session was opened on October 11

SILICA GELS. See CHEMISTRY.

SILK. By 1924 the United States had become the largest and most important silk-consuming and silk-manufacturing country in the world, taking approximately three-quarter's of the world's production However, it was dependent entirely upon foreign countries for raw materials. Japan was the leading producer of raw silk (see tables), so that the greater part of the United States' silk imports came from Japan, with China and Italy ranking second and third respectively. In 1923, the raw silk imported into the United States amounted to 49,505,581 pounds, valued at $391,942,417. The countries from which it was imported were as follows·

	Pounds	
France	516,080	$4,564,702
Italy	2,449,688	20,726,043
China	12,261,561	83,395,432
Japan	33,377,971	275,908,398
Other countries	900,281	7,347,842

The total imports of silk and manufactured silk during the year 1923 were valued at $446,210,331. That most of this material is consumed in the United States is indicated by the fact that in 1923 the total manufactures of silk exported were valued at $11,136,578.

The condition of the silk manufactures industry in 1914 and 1921 is shown by the following census figures:

SILK MANUFACTURES INDUSTRY [a]

Years	Number of establishments [b]	Persons engaged	Salaries and wages
1914	856	115,571	$57,615,000
1921	1,565	131,697	134,095,000

Years	Cost of materials	Value added by manufacture [c]	Value of products
1914	$144,442,000	$109,569,000	$254,011,000
1921	337,559,000	245,860,000	583,419,000

[a] Bureau of the Census Report on Silk Manufactures, 1921.

[b] Statistics for establishments with products valued at less than $5000 are not included in the figures for 1921; there were 109 establishments of this class which reported 225 wage earners and products valued at $365,500 For 1914, however, data for such establishments are included in the figures, with the exception of the item "Number of establishments"

[c] Value of products less cost of materials

WORLD RAW SILK PRODUCTION, INCLUDING TUSSAH SILK [a]

	1922–23 Pounds	1921–22 Pounds	1920–21 Pounds	1919–20 Pounds	1918–19 Pounds	1917–18 Pounds
Europe	8,841,000	7,628,000	8,058,000	4,927,000	6,978,000	7,154,000
Viz						
Italy	8,234,000	7,066,000	7,330,000	4 045,000	5,942,000	6,217,000
France	437,000	430,000	551,000	397,000	540,000	452,000
Austria	.	.	.	[d] 331,000	[d] 331,000	[d] 331,000
Spain	170,000	132,000	177,000	154,000	165,000	154,000
Levant	1,543,000	1,213 000	1,654,000	[d] 2,293,000	[d] 2,293,000	[d] 2,293,000
Asia Total quantity exported [b]	57,439,000	53,941,000	35,138,500	51,860,000	45,475,000	48,026,000
Viz						
China, Shanghai	[c] 8,628,000	[c] 6,993,000	[c] 6,518,500	[c] 10,225,000	[c] 9,209,000	[c] 8,563,000
China, Canton	7,050,000	5,735,000	4,210,000	7,093,000	3,704,000	5,170 000
Japan, Yokohama	41,541,000	40,982,000	24,300,000	34,222,000	32,308,000	34,050,000
India	220,000	231,000	110,000	320,000	254,000	243,000
Total, pounds	67,823,000	62,782 000	44,850,500	59,080,000	54,746,000	57,473,000
Tussah	2,034,000	1,856,000	1,650,000	1,960,000	1,561,000	1,534,000
Grand total, pounds.	69,857,000	64,638,000	46,500,500	61,040,000	56,307,000	59,007,000

[a] Compiled by the Statistical Bureau of The Silk Association of America.

[b] The production of raw silk in China and India is unknown. The Japan crop is approximately 47,000,000 pounds.

[c] Excludes Tussah silk.

[d] In the absence of statistics from Austria and the Levant, 1915 production is used as an estimate.

The crop years from 1913–14 to 1916 showed a total production as follows: 1916–17, 59,800,000 pounds; 1915–16, 53,090,000; 1914–15, 48,468,000; 1913–14, 59,972,000. The distribution followed very much the same proportions as for the years 1918 to 1923 given more completely in the table, taking into consideration, of course, the effect of the War in Europe and Asia Minor.

SILK, ARTIFICIAL. The artificial silk industry began in the United States about 1910 and by 1920 had reached an annual production of 10,000,000 pounds. After that time the production of the artificial silk increased even more rapidly, so that in 1923 the six larger companies engaged in this manufacturing reported a production of 35,490,000 pounds, as

IMPORTS OF RAW SILK AT ALL PORTS OF THE UNITED STATES [a]

THREE FISCAL YEARS, JULY 1 TO JUNE 30

Imports	1922–1923	1921–1922	1920–1921
Raw silk, including Tussahs and Doppioni, bales	391,882	354,363	217,910
Raw silk, including Tussahs and Doppioni, pounds	52,683,604	48,178,964	29,462,745
Raw silk, invoice value, dollars	$405,796,394	$300,445,363	$181,882,615
Spun silk, pounds	993,466	1,494,938	2,545,817
Spun silk, invoice value, dollars	$2,956,169	$4,309,531	$10,050,857
Waste silk, pounds	10,123,922	9,097,339	5,289,923
Waste silk, invoice value, dollars	$7,388,144	$6,717,210	$8,397,986

CLASSIFICATION OF THE RECEIPTS OF RAW SILK IN THE UNITED STATES

Shipping	1922–1923			1921–22			1920–1921		
bales	Bales	Pounds	Value	Bales	Pounds	Value	Bales	Pounds	Value
Japans	299,941	37,989,046	$298,795,272	282,450	38,590,110	$249,108,057	159,977	20,815,912	$130,078,570
Cantons	48,683	5,701,381	39,379,547	40,559	4,341,995	28,331,168	26,689	2,846,650	15,311,980
Chinas	26,982	3,949,922	30,061,518	16,810	2,249,477	13,190,413	21,582	3,169,298	20,553,553
Tussahs	6,299	933,645	3,859,829	5,441	737,205	2,277,129	1,406	189,330	776,253
All others	9,977	4,109,610	33,700,288	9,103	2,260,177	12,538,596	8,256	2,441,555	15,159,259
Totals	391,882	52,683,604	$405,796,394	354,363	48,178,964	$300,445,363	217,910	29,462,745	$181,882,615

[a] Compiled by the Statistical Bureau of The Silk Association of America.

PRODUCTION OF PRINCIPAL CLASSES OF SILK GOODS [a]

Classes		1914	1919	1921
Broad silks	yards	216,033,696	310,132,060	273,455,388
Velvets	"	16,318,135	16,150,689	11,477,143
Plushes	"	9,114,992	5,860,527	5,580,386
Upholstery and tapestries	"	447,699	516,281	973,749
Silk threads and yarns	pounds	(1)	11,810,028	14,466,167
Ribbons	value	$38,201,293	$66,186,609	$53,597,988
Braids and bindings	"	3,073,648	13,218,284	15,879,046

[a] Bureau of Census Report of Silk Manufactures, 1921. (1) No figures available.

UNITED STATES IMPORTS OF SILK AND SILK MANUFACTURES [a]

Years	Unmanufactured silks [b] Pounds	Silk fabrics [c] Value	Silk manufactures Value
1913	34,196,662	$9,843,637	$31,776,299
1919	55,522,372	29,264,585	54,700,816
1920	39,660,101	35,514,422	75,327,914
1921	52,332,325	24,330,602	48,248,777
1922	58,466,661	17,923,401	37,412,524
1923	62,017,470	17,930,443	44,345,758

[a] Statistical Abstract of the United States and Monthly Summary of Foreign Commerce of the United States, December, 1922.
[b] Cocoons, raw silk, and waste.
[c] Except pile fabrics.

compared with 26,000,000 pounds in 1922, and estimated that in 1924 they would turn out 41,600,000 pounds. The Viscose Company alone which started production in 1911 had not only a main plant at Marcus Hook, Pa., but other factories at Lewistown, Pa., and Roanoke, Va., and had an output for 1923 of approximately 27,500,000 pounds. It was extending its facilities so that in 1924 it was able to turn out more than 32,000,000 pounds. As showing the distribution of this industry in the United States the accompanying table from the *Textile World* is of interest.

Firm	1923 Production Pounds
Visase Company	27,500,000
Du Pont Fibresilk Co.	2,750,000
Tubize Artificial Silk Co.	3,500,000
Industrial Fibre Corp.	1,200,000
Cupra, Inc.	40,000
Lustron Co.	500,000
Total	35,490,000

The United States is fast becoming the most important producer of artificial silk in the world, and while there were no accurate statistics available, it was estimated that the world total for 1922 was about 80,000,000 pounds and for 1923 about 90,000,000 pounds, or about 50 per cent more than the production of real silk. Artificial silk was being used in the United States for hosiery, dress goods, shirtings, and in combination with real silk for crêpes and ribbons. Not only was there an increased production of artificial silk in the United States in 1923, but also increased imports, the total "yarns, threads, and filaments" arriving in the United States during the calendar year 1923, amounting to 3,906,037 pounds valued at $6,738,031 as compared with 2,087,775 pounds valued at $3,908,710 during 1922. The exports of artificial silk products during 1923 included 1,113,218 dozen pairs of hosiery valued at $4,906,408, as against 1,439,056 dozen pairs valued at $6,172,550 during the corresponding period in 1922, and other manufactures of artificial silk amounting to 571,718 pounds, valued at $1,690,044

SILVER. On June 30, 1917, it was estimated that the silver dollars in the United States Treasury and their circulation totaled $568,000,000, of which $497,000,000 were in the Treasury and $71,000,000 in circulation and in the banks. It was proposed to melt these coins and to sell as bullion a quantity not in excess of $350,000,000, and to replenish the deficiency so produced by the purchase from time to time of an equivalent amount of bullion at the fixed price of one dollar per ounce, 1000 fine. This was done under the terms of the so-called Pittman Act, approved Apr. 23, 1918, and the immediate effect was to remove the free market in the United States and in London, and make the quotations at the former market in the neighborhood of one dollar per ounce for the life of the Act. The Pittman Act was considered the most important in the history of silver since the repeal of free coinage in France and India, and its effect was to render more profitable the mining and production of silver in the refining of the baser ores under the terms of the Pittman Act which expired in 1913.

Purchases of silver were made by the United States government as follows:

PURCHASES OF SILVER UNDER THE PITTMAN ACT

	Ounces
1920	29,907,361
1921	58,662,527
1922	62,181,024
1923 [a]	49,834,123
Total	200,585,035

[a] Last purchases in June.

Up to June 30, 1923, 222,146,473 silver dollars had been recoined.

In 1923 the exports of silver from the United States were valued at $72,463,780 while the imports were valued at $74,453,530.

PRODUCTION OF SILVER IN THE WORLD [a]

Calendar years	Fine ounces	Commercial value
1914	172,263,596	$95,261,769
1915	173,000,507	89,911,664
1916	181,298,645	124,352,374
1917	186,611,879	166,676,449
1918	203,428,148	200,266,876
1919	179,849,940	201,588,402
1920	173,260,580	176,621,835
1921	171,285,542	108,110,295
1922	213,541,784	145,067,467

[a] Bureau of the Mint.

PRODUCTION OF SILVER IN THE UNITED STATES

Calendar years	Fine ounces	Commercial value
1914	72,455,100	$40,067,700
1915 [a]	74,961,075	37,397,300
1916	74,411,802	48,953,000
1917	71,740,362	59,078,100
1918	67,810,139	66,485,129
1919	56,682,445	63,533,652
1920	55,361,573	60,801,955
1921	53,052,441	53 052,441
1922	56,240,048	56,240,048
1923	72,611,200	59,541,184

[a] Record production.

UNITED STATES REFINERY PRODUCTION OF SILVER—1923 [a]

	Ounces	Value at 82¢ [b]
Alaska	687,900	$564,078
Arizona	7,239,100	5,936,062
California	3,740,700	3,067,374
Colorado	5,607,100	4,597,822
Idaho	7,832,000	6,422,240
Illinois	8,100	6,642
Michigan	253,700	208,034
Missouri	145,200	119,064
Montana	14,191,500	11,637,030
Nevada	10,507,000	8,615,740
New Mexico	778,400	638,288
North Carolina	100	82
Oregon	64,400	52,808
Pennsylvania	1,100	902
South Dakota	93,400	76,588
Tennessee	107,600	88,232
Texas	820,100	672,482
Utah	20,275,700	16,626,074
Washington	220,000	180,400
Wyoming	100	82
Philippine Islands	38,000	31,160
Total	72,611,200	$59,541,184

[a] Estimates of the Bureau of the Mint with the cooperation of the United States Geological Survey.

[b] Average to Pittman Act price ($1 per ounce) January to June, and of New York price July to December, inclusive.

It will be noted that in 1923 the State of Utah produced 20,275,700 ounces or nearly 28 per cent of the United States production and the record silver production of any single State for any year. This was derived mostly from the refining of lead ores.

SIMMEL, GEORG (1858-1918). German philosopher and historian (see VOL. XXI). One of the clearest and internationally most respected thinkers before the War, Simmel took to heart the European catastrophe. He sought refuge in the philosophy of art and composed an appreciation of *Rembrandt* (1917). Shortly before his death he wrote his philosophic testament in the form of a *Lebensanschauung* (1918). A number of studies on Simmel and the various phases of his philosophy were published in Germany after the master's death; among these may be mentioned Max Adler's *Georg Simmels Bedeutung für die Geistesgeschichte* (1919).

SIMMONS COLLEGE. A nonsectarian technical institution for women at Boston, Mass., founded in 1899. The student enrollment increased from 1083 in 1915 to 1253 in 1920, and dropped again to 1197 in 1923–24. During the same time the faculty was increased from 118 to 121 members, and the library from 22,000 to 36,000 volumes. An endowment campaign was begun in 1921. Certain changes in the requirements were instituted in 1920; three years instead of two of language were required, "free margin" subjects were accepted with limitations, and no conditions were allowed. President, Henry Lefavour, Ph.D., LL.D.

SIMONDS, FRANK H(ERBERT) (1878–). An American journalist (see VOL. XXI). In 1914 he became military editor of *The Review of Reviews*, and was an associate editor of the *New York Tribune* from March, 1915, to December, 1918. He wrote: *They Shall Not Pass—Verdun* (1916), and a *History of the World War* (5 vols.).

SIMONS, GEORGE ALBERT (1874–). An American clergyman, born at LaPorte, Ind., and educated at Drew Theological Seminary. He entered the ministry of the Methodist Episcopal Church in 1899 and preached in Brooklyn and New York City. In 1907 he became superintendent of the Finland and St. Petersburg Mission Conference and later held several similar positions. He founded two publications, *Methodism in Russia*, and *Christiansky Pobornik*, in Petrograd. During the War he was chairman of the Red Cross Committee in Russia, and in February, 1919, he testified before the United States Senate in regard the Bolshevik rule in Russia. In the winter of 1920 he had charge of the distribution of relief supplies sent by the Methodists to Finland, Russia, etc. He was manager of the Russia Methodist Book Concern

SIMPLON TUNNEL. See TUNNELS.

SIMS, WILLIAM SOWDEN (1858–). An American naval officer (see VOL. XXI). He was president of the Naval War College in 1917, became an admiral in 1918, was again appointed president of the War College in 1919, and retired in the same year with the rank of rear-admiral. In 1920, in an extensive report to the United States Senate subcommittee, he alleged grave errors in the management of United States naval operations during the War.

SINCLAIR, HARRY FORD (1876–). American oil producer, born at Wheeling, W. Va. He was educated at public schools in Kansas, and studied pharmacy at the University of Kansas. After spending some years in the drug business, he turned his attention to oil and became president of the Sinclair Oil and Refining Corporation and the Sinclair Gulf Corporation which in 1919 were consolidated as the Sinclair Consolidated Oil Corporation, of which he became chairman. During 1923–24, the leasing from the government of certain oil properties by this corporation led to a Congressional investigation and a demand for the annulment of the leases. In 1917, he was appointed a member of the committees on oil, raw materials, minerals, and metals of the National Research Council. In addition to his oil interests, he held office or directorships in various fiduciary corporations in Oklahoma and Pittsburgh, Pa.

SINGAPORE. See STRAITS SETTLEMENTS.

SINGMASTER, Elsie (Mrs. Harold Lewars) (1879–). An American author, born at Schuylkill Haven, Pa., and educated at Radcliffe College. She wrote: *When Sarah Saved the Day* (1909); *When Sarah Went to School* (1910); *Gettysburg—Stories of the Red Harvest and the Aftermath* (1913); *Katy Gaumer* (1914); *Emmeline* (1916); *The Long Journey* (1917); *Life of Martin Luther* (1917); *History of Lutheran Missions* (1917); *Basil Everman* (1920); *John Baring's House* (1920); *Ellen Lewis* (1921); *Bennett Malin* (1922); *The Hidden Road* (1923). She also contributed short stories to magazines.

SIN-KIANG. A Chinese outer territory, consisting of Chinese Turkestan, Kulja, and Kashgaria, thus comprising all Chinese dependencies lying between Mongolia and Tibet. Area, 550,580 square miles; estimated population, (2,500,000). The whole was regarded as a separate province and the capital, Urumchi, was the seat of the Chinese civil governor. A more assiduous cultivation of the soil, in which irrigation helped greatly, accounted for an increasing prosperity during 1914–24 Leading products included cereals, fruits, vegetables, wool, cotton, silk, jade, and gold. Principal imports from China proper were tea, silks, and cotton piece goods. Imports from India were cotton piece goods, indigo, leather, paints, silk piece goods, spices, etc. Principal centres for Chinese trade were Urumchi and Kucheng while the principal centres of British trade were Yarkand, Kashgar, and Khotan Before the War, the Russian interest in the country was keen and through political agents and traders from Russian Turkestan its influence was spreading through the population. This penetration for a time ceased as a result of the Revolution so that in 1924 it was not yet evident whether the Soviet meant to win over Chinese Turkestan's Turanian population.

SINN FEIN. See Ireland.

SINO-JAPANESE AGREEMENT. See Japan, *History.*

SISSON, Edgar Grant (1875–). An American editor, born at Alto, Wis. He studied at the Northwestern University from 1894 to 1897 and was a member of the staffs of several papers in Chicago as reporter and editor, until 1911, when he became managing editor of *Collier's Weekly.* He was editor of the *Cosmopolitan Magazine,* 1914–17, and associate chairman of the Committee on Public Information (1917–19), with general direction of the foreign section. He organized the publication and distribution of President Wilson's speeches throughout Russia in 1917–18, and made to President Wilson the first report published by the government (1919), under the title *The German-Bolshevik Conspiracy.* He became news editor of the New York *World* in 1921.

SIXTUS LETTERS. See War, Diplomacy of the.

SKATING. See Sports.

SKINS. See Leather.

SLADEN, Fred Winchester (1867–). An American army officer, born in Massachusetts, and graduated from the United States Military Academy in 1890. He was on duty in Oregon, Washington, Idaho, and the Philippines. He engaged in relief work in San Francisco after the earthquake and fire in 1906 and was in China during 1914 and 1916 and on the Mexican border in 1916–17. He was secretary of the War Department General Staff in 1917 and 1918. He was commander of the 5th Infantry Brigade of the 3rd Regular Division in France and Germany in 1918 and 1919 and was active in the Aisne, Château-Thierry, Marne, St. Mihiel, and Meuse-Argonne defensives He was appointed superintendent and Commandant of the United States Military Academy in July, 1922

SLAVONIC LITERATURE. In 1914, the literature of all the Slavonic peoples was feeling the influence of the various movements which were agitating France and western Europe. Realism was giving place to symbolism and to modernism of various kinds and schools. Then came the War, which radically changed the external life of the different peoples. Poland became a battle ground; Czecho-Slovakia and the Jugo-Slavs saw themselves forced into a war in which their sympathies were on the side of their official enemies, and their hatred was for their superiors. With the end of the War came the restoration of independence to these different peoples and a complete change in the future which they saw before them. The great changes in the literature accompanying this great political and social upheaval had hardly yet taken place and it was still too soon in 1924 to define with certainty the definite results that would be produced.

In Poland, the death of the greatest of her authors, Sienkiewicz, in 1916, removed the one man who had secured a recognized place in the international world of letters. The other men of the younger generations—men like Wladyslaw St. Reymont, author of *The Peasants* and several historical novels; Stefan Zeromski, author of several historical novels, notably *The Wind from the Sea;* and Andrzej Strug, author of *Tomb of the Unknown Soldier,* a psychological study—continued the tradition of the Polish novel. Jozef Weyssenhof was perhaps one of the foremost short-story writers, although these were very numerous and among them were several women of considerable ability. In poetry, Leopold Staff, Jan Kasprowicz, Tuwim and others wrote lyric poetry and lyric dramas which are worth attention. The spirit of the new Poland with its promise for the future, which was first indicated by the poet-artist Stanislaw Wyspianski, is shown in its modern form in the collection of stories by Eugeniusz Malaczewski, *The Horse on the Hill,* in which amid the scenes of the Polish-Bolshevik war we see the vision of the new country and of the new spirit, as we do also in many of the war songs of the people. Perhaps we should include here also the account of the Mongolian adventures of the Polish professor Ferdinand Ossendowski, which attained wide circulation in its English translation as *Beasts, Men and Gods.* Amid all its changes, Polish literature still maintained on the whole its chivalrous and knightly air which is one of the chief features of the Polish genius.

The Czecho-Slovak situation was quite different. The people were struggling whole-heartedly to break the bonds which bound them to Austria-Hungary and this gave to much of their poetry a cryptic and enigmatic character. As it was, many of the leading poets, as Machar and Dyk, were arrested and kept in prison for their opposition to Austria. Among the other poets who pleaded the cause of the people more or less openly, we may mention Sova and Theer and also Křička, the author of the first of the war songs. Langer and Medek sang of the ex-

ploits of the Czecho-Slovak legions in Siberia and described in verse the heroic exploits of these wandering soldiers After the War, Czecho-Slovak poetry was optimistic and the authors ranged from free verse to the conservative forms, as in Otokar Fischer and Josef Chaloupka. Among those who progressed the furthest toward the left we may mention Stanislav K. Neumann, a brilliant and talented poet. The mystic Otokar Březina had written little and his influence was still inconsiderable. Among the novelists of prominence were A. Jirásek, K. M. Čapek and Anna Marie Tilschová. When we seek for the national inspiration we find it in the writings and speeches of President Thomas G. Masaryk who himself summed up and exemplified much if not most of the modern intellectual life of his people. The usual optimistic mood of the nation, however, had not been expressed in the drama, where Karel Čapek (q.v.) with his two plays *R. U. R.* and *The Insect Comedy* gave a pessimistic and satirical view of life which won for them presentation not merely in his own country but also in England and America. Finally we may mention that Hviezdoslav (Pavol Országh), the foremost singer of the Slovaks, died in 1921.

In the Kingdom of the Serbs, Croats and Slovenes, the same tendencies predominated The older authors, as Anton Tresić Pavičić, a poet and novelist of Dalmatia had largely withdrawn from publication and had left the field to the younger representatives of the modernists and symbolists, e.g. the novelists Tsankar, Kosor and Nazor and the poets Jovan Dušic, Milan Rakić and Miličić. In addition to the struggle of generations there was also continuing an interesting process of fusion. The Serbs and the Croats published their works indifferently in the Cyrillic of the Serb and the Latin of the Croatian but there was still a certain difference in spirit coming from the long centuries of isolation and subjection to different cultures, the Byzantine of the East and the Latin of the West, and the complete merging of these two streams of poetry and thought was expected to produce some interesting and valuable works in the near future. We must mention also Nikolaj Velimirović, Orthodox Bishop of Ochrida, a distinguished preacher and writer whose books have often been translated and who did much to carry the knowledge of his people outside his country. During the War he won a name for himself as one of the great preachers of England, where he went in connection with the education of Serb refugees and where he was frequently invited to preach in St. Paul's Cathedral, London

Among the poets and novelists of the Slovenes, may be mentioned Ivan Cankar, whose novel *Pictures of Dreams* reflects the unreal and terrible experiences of the War. Other authors are Oton Zupančič, Dragotin Kette, Josip Murn, and Ivan Pregelj.

Bulgaria also lost, immediately after the War, her greatest poet, Ivan Vazov, who died in 1921. He had been associated with the Bulgarian movement for independence from its very beginning, and his prose and verse describe almost every phase of the life of the people. In 1920, the nation gave him a jubilee on the fiftieth anniversary of the commencement of his writing and it was a fitting prelude for the manifestation of national sorrow which accompanied his death. The younger Bulgarian authors followed the usual schools of western Europe and of Russia.

SLEEPING SICKNESS. The popular name of this affection, known to the medical profession as epidemic encephalitis, is unfortunate, because this title is preëmpted by a chronic affection which is endemic among the African blacks. (The last named disease is known technically as trypanomiasis.) Although the acute form of sleeping sickness is by no means new, having flourished in different localities under various names in the past, it was not recognized as a separate morbid entity until about 1916 and since that period it has become familiar to medical men throughout the temperate zones. Nothing is known of its intimate nature, but it stands in some vague relation to infantile paralysis and epidemic meningitis. It has a high mortality and is apt to leave its victims badly damaged. It occurs in epidemic incidence but attacks only a relatively small proportion of the community. The severity of its nature is due to the fact that it attacks some of the most important portions of the central nervous system. From another viewpoint, it suggests an affinity with influenza, which affection in rare cases attacks the brain and causes a condition very similar to sleeping sickness. A certain number of cases of the latter have occurred in individuals recovering from the grippe.

Epidemic encephalitis is characterized by a great variety of symptoms and a number of clinical types have been isolated, some of which may appear in abortive form. Hence diagnosis may be difficult in the individual case for somnolence may be absent and be replaced by excitement and constant muscular twitching. In some localities, this form may predominate, and may be recognized in a disease which prevailed in Italy 80 years ago. This persisted for some years and at no time was drowsiness mentioned as a characteristic symptom. This is an additional reason against the use of the term "sleeping sickness."

SLEMP, C(AMPBELL) BASCOM (1870–). An American Congressman, born at Turkey Cove, Lee Co., Va., and educated at the University of Virginia. He taught mathematics at the Virginia Military Institute and later practiced law in Virginia, at the same time acting as an officer in several business concerns. He was elected to Congress first in 1907 and served continuously thereafter until he was appointed secretary to President Coolidge in 1924.

SLESVIG. See SCHLESWIG.

SLOAN, JOHN (1871–). An American artist, born at Lock Haven, Pa. He received his art education in evening classes in the Pennsylvania Academy of Fine Arts under the late Thomas P. Anschutz. He was particularly noted for his scenes of city life. His lithographs are humorous and vivid, as for example, that of a workingman, pipe in mouth, hands in pockets, sitting on the roof with his back against a chimney and his stockinged feet stretched out before him, enjoying solid Sunday peace and freedom. Mr. Sloan has made many drawings for magazines, and his work as an illustrator included designs for Paul de Kock's novels. For his painting "The Coffee Line," at the Carnegie Institute, Pittsburgh, Pa., he received honorable mention in 1905. "The Dust Storm" is in the Metropolitan Museum, New York City, and examples of his work

are included in the print collection at the New York Public Library. He was an instructor at the Art Students' League in New York City and director of the Society of Independent Artists.

SLOVAKIA. See CZECHO-SLOVAKIA.

SLOVENES. See JUGO-SLAVIA, *History*.

SMALL ARMS AND MACHINE GUNS. If we include under the heading "Small Arms" (see also ORDNANCE), shoulder rifles, pistols, machine guns, ammunition and accessories, the decade between 1914 and 1924 was marked principally by developments in machine guns. Prior to the War, practically all machine guns used the same caliber ammunition as the shoulder rifles with which the infantry was equipped, and were employed as a means by which a given number of individual soldiers could deliver a greater volume of fire at the enemy than if equipped with shoulder rifles. Under stress of actual combat, machine guns were soon divided into different types especially suited for particular uses. The lighter weight types were adapted to firing short concentrated bursts of fire and the heavier types were developed for playing the continuous leaden stream of the machine gun barrage. Special types were developed for mounting in tanks and in airplanes and special mounts were developed for employing machine guns in anti-aircraft work.

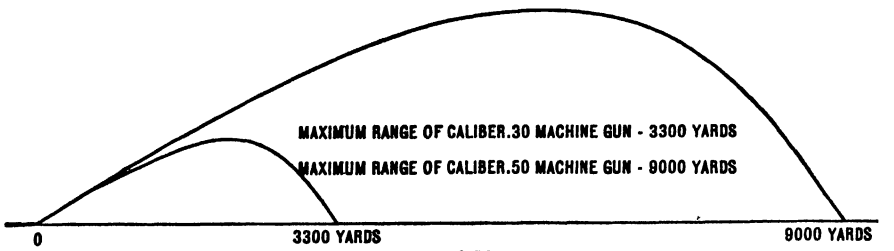
The special-type guns necessitated the development of special types of ammunition; for instance, armor piercing for use against tanks and armored airplanes, tracer and incendiary ammunition for use against observation balloons and gasoline tanks of airplanes. The need for larger cavities to contain the special composition required in tracer and incendiary ammunition led to the development of larger caliber bullets for which heavier and heavier machine guns became necessary, with the result that the sphere of employment of the machine gun was enormously increased and its range of action multiplied two and one-half to three times.

Shoulder Rifles. Prior to the outbreak of the War, the United States Army adopted the Springfield rifle, Caliber 0.30, Model of 1903, as standard equipment for infantry and cavalry troops This rifle and the standard ammunition for it easily led the world, as was repeatedly demonstrated in international rifle matches. Its nearest competitor was the German Mauser, the shoulder rifles in use by other armies being relatively much inferior. Under battle conditions, the Springfield maintained its supremacy and even by 1924 was susceptible of further improvement only in minor particulars, such as providing a large aperture sight to be located on the receiver near the eye, telescopic sights for issue to individual sharpshooters, and possibly a change in the stock to provide a pistol grip.

Unfortunately, due to difficulty of production, it was impossible to manufacture enough Springfield rifles to completely equip the United States troops or to provide any for troops of the Allied armies, much as they desired this superior weapon. The greater number of the United States troops were equipped with the modified Enfield rifle of British design rechambered for rimless 0.30 caliber United States ammunition instead of the older type British 0.303 cartridges with projecting rim which tended to increase the danger of jams. Incidentally the United States ammunition had a much higher velocity than the British cartridge and was much more effective at all ranges at which rifle fire is employed.

Pistols. The Colt automatic pistol, caliber 0.45, was beyond question the most effective weapon of its kind in use prior to the outbreak of the War and no improvements in it were found necessary as the result of battle experience. Unfortunately the difficulty of manufacturing this weapon necessitated the issue of a considerable number of 0.45 caliber revolvers to United States troops which, even at that, were much better equipped in this respect than the troops of any other nation engaged in the War.

Automatic Rifles. The second type of weapon using standard small arms ammunition is intended to be a portable arm for front-line troops, capable of being fired from the hip if necessary, and to some extent even while proceeding forward to the attack. Its normal employment, however, is from the ground supported by a light biped at the muzzle, the gunner taking the prone position. For this purpose the British army used the Lewis gun, the Germans the Maxim 08–15, and the French, the Chauchat, the United States troops being armed to a considerable extent with the latter weapon prior to the issue of the standard Browning automatic rifle developed contemporaneously with the entrance of the United States into the world conflict. The Browning was probably the most successful weapon of its type in use at the end of the War, but mature reflection on the relative merits of the type led to a conclusion that it was a misfit, being too light for sustained automatic fire and too heavy to be fired from the shoulder. Later tendencies were toward providing a much heavier barrel in order that it may be fired for a greater length of time without putting it out of action by overheating. Provided in addition with a substantial biped mount, it comes under the classification of machine rifles to which the French Chauchat, the British Lewis and the German Maxim more nearly belong than to the class of strictly automatic rifles.



DIAGRAMMATIC COMPARISON OF TRAJECTORIES; 0.50 CALIBER AND 0.30 CALIBER BROWNING MACHINE GUNS

Machine Guns. In 1914, the principal types of machine guns were the Benet-Mercie, the Colt, the Maxim, the Vickers, the Lewis and the

Hotchkiss. In May, 1917, the Browning (heavy) machine gun received its initial test and was at once adopted as standard for the United States Army. The new gun demonstrated its superiority to all other types of machine guns then in use by the armies of the world. Although the maximum range of this gun was found to be less than some types of French and also German machine guns, the fault lay in the ammunition used and not in the gun itself. With improved ammunition this gun, which is recoil-operated and water-cooled, is a most effective weapon for delivering a sustained fire of great volume.

Aircraft Machine Guns. The machine gun found a new field of employment in connection with aircraft, two general types of mounting being developed as the result of combat experience in the clouds. For the use of the pilot, two or more guns are rigidly mounted on the airplane structure and fired directly to the front, the bullets being fired between the rapidly revolving blades of the propeller by means of a synchronizing mechanism connecting the motor and the gun. For the use of the observer, a free gun is so mounted as to permit of fire in any direction. Vickers aircraft machine guns were used to a considerable extent for the pilot and Lewis guns for the observers. Marlin aircraft guns were later adopted when Vickers became unavailable, due to great care necessary in the manufacture of ammunition for this gun. Browning machine guns were modified for aircraft use but were not entirely satisfactory, due to the haste in which they were developed. Several attempts to improve this gun have been made recently but up to 1924 none has been entirely satisfactory.

Anti-Aircraft Machine Guns. At first it was thought that anti-aircraft machine gunnery involved merely providing a simple mount which would permit all-around-traverse and elevation of 85 or 90 degrees. The usual type of mount used by anti-aircraft machine gunners during the War consisted of an adapter head with a pintle at the lower part of the bracket which revolved freely on the head of a tripod. The upper part of the bracket was provided with a U-shaped opening in which the machine gun was mounted, thus making it possible to elevate the gun about its transverse axis and to traverse it by rotating the entire mount adapter about the pintle. The anti-aircraft machine gun made a place for itself in the equipment of all armies, and considerable effort has been expended in the development of more satisfactory mounts for this type of weapon. In order to increase the volume of fire, it is probable that more than one gun will be mounted on each tripod. A semi-ball mount adapter has been manufactured and tested since the Armistice and future design was tending toward this type.

The effective range of 0.30 caliber ammunition limits the employment of the ordinary machine gun to attack upon the personnel of aircraft or upon the structure of low-flying unarmored planes. The development of the super-machine gun of 0.50 caliber bids fair, however, to displace the earlier 0.30 caliber gun not only on account of its greater range but because its much larger bullet permits the development of more satisfactory armor-piercing, incendiary and tracer varieties.

Super-Machine Guns. The Browning 0.30 caliber machine gun was brought out contemporaneously with the entrance of the United States into the world conflict. It proved so successful from its first tests that early effort was made to apply its principles to the design of a machine gun to fire 0.50 caliber ammunition. The first design fired a bullet of 600 grains at a muzzle velocity of 2450 feet per second. About this time several German anti-tank guns were captured. Inasmuch as the 13-mm. ammunition for these guns fired an 800-grain bullet at a muzzle velocity of 2500 feet, a second design of 0.50 caliber machine gun was brought out firing an 812-grain bullet at a muzzle velocity of 6200 feet per second.

A water-cooled 0.50 caliber machine gun has been designed for ground use by infantry troops, but it develops so much energy in firing that it is impossible to hold it steady for horizontal fire, using a tripod of such light weight as can be conveniently transported by infantry. An air-cooled type for mounting on aircraft has proved very successful and bids fair to be universally adopted as a synchronized weapon. A water-cooled type has also been developed for anti-aircraft use. This gun has a maximum range of approximately 9000 yards, its armor-piercing bullet will penetrate one inch of armorplate at short ranges, and the tracer bullet will give a brightly illuminated trace for approximately 2500 yards.

Small Arms Ammunition. The War vastly increased the ranges at which small arms ammunition was expected to be used effectively. In order to meet insistent demands for greater range, extensive test firings were continually held in all armies and every effort made to improve the shape of the bullet and increase the effectiveness of the powder charge. In general, it has been found desirable to further sharpen the nose of the bullet in order to reduce the effect of air resistance and also to "boat-tail" or taper the base, in order to eliminate or greatly reduce the drag caused by the vacuum at the base. The improved contour of the bullet has permitted an increase in weight, and with the increased remaining velocity at any given range, a considerable increase in hitting power has been obtained. See STRATEGY AND TACTICS.

SMALLPOX. During the 10 years 1914–24, much information was gained about this affection. The conviction is growing that there are different strains of the disease, one of which is naturally mild and the other severe. Should this dualistic view obtain a permanent foothold many peculiarities of the disease may be explained. A severe type of disease may, of course, have its virulence modified and appear alternately in mild or severe form; but there may be a mild form which is never severe under any circumstances. This appears to be the case with the alastrim of the West Indies, which is believed to be the same as the mild smallpox of western Africa, from which it was originally derived. The latter has long been regarded as distinct from the severe smallpox of eastern Africa. The severity of the latter, as of other virulent strains of the disease in the tropics, makes it difficult to control by vaccination, to which must be added the great difficulty of obtaining fresh virus, and the difficulty in enforcing vaccination decrees in primitive communities.

The alleged failure of vaccination in the Philippines was readily shown to have been due to lax enforcement of the laws, the turning in of bogus returns and other irregularities. The unvaccinated were the sufferers and the country

later was properly revaccinated, with resulting return of immunity. During the War, there were numerous striking examples both of immunity of vaccinated troops exposed to virulent disease and the spread of the disease among the unvaccinated.

Paul Test. A new diagnostic test was in force in some localities which will prevent the long quarantine of suspects. This consists in the inoculation with the suspicious matter of the rabbit's cornea, cock's wattles, etc Smallpox pus provokes a peculiar reaction not obtained with the use of any other substance. This is known as the Paul test.

SMALLWOOD, WILLIAM MARTIN (1873–). An American zoölogist born at Warsaw, N. Y He was educated at Syracuse University and at Harvard. He was instructor in biology at Syracuse (1896–98), professor of biology and geology at Allegheny College (1898–1902), and associate professor of zoölogy (1903–07), and professor of comparative anatomy (1907–) at Syracuse University. He published papers on the embryology of mollusca, and *A Text Book of Biology* (1913; 2d ed., 1920), *Practical Biology* (1916), *Biology for High Schools* (1920); *Man the Animal* (1921).

SMELL. See PSYCHOLOGY, EXPERIMENTAL

SMILLIE, ROBERT (1859–). A British labor leader, born at Belfast, of Scottish parents. At 14 years of age he went to work in a shipyard at Govan, and two years later went to Lanarkshire where he worked in the mines for 16 years. He was an active trade unionist, and through his efforts the Lanarkshire Miners' Union reached a membership of 30,000 He possessed so much organizing ability that he was promoted steadily until in 1912 he was elected to the presidency of the Miners' Federation of Great Britain. In March, 1921, ill health compelled him to resign from the Federation.

SMITH, ALFRED EMANUEL (1873–). An American public official, born in New York City. He was educated in the parochial schools of the city and from 1895 to 1903 was clerk in the office of the Commission of Jurors in New York City. He was a member of the Democratic organization and served in the New York Assembly from 1903 to 1915 In 1911, he was Democratic leader and, in 1913, Speaker in that body. From 1915 to 1917, he was sheriff of New York County In the latter year he was elected president of the Board of Aldermen and in 1919, governor of New York State He was reelected to this office in 1922, defeating Charles S. Whitman, Republican candidate. Governor "Al" Smith was one of the most conspicuous candidates for the Democratic nomination for the Presidency in 1924. See UNITED STATES, *History.*

SMITH, ALFRED H(OLLAND) (1864–1924) An American railway president (see VOL. XXI). During the War he was appointed assistant director-general of railroads in charge of transportation in trunk-line territory east of Chicago and north of Ohio and the Potomac Rivers, and regional director of the Eastern District On June 1, 1919, he was reappointed president of the New York Central lines It was generally conceded that he was one of America's most progressive and far-sighted captains of industry.

SMITH, DAVID STANLEY (1877–). An American composer, born at Toledo, O. While pursuing his regular academic studies at Yale, he also took the course in composition there under Professor Parker. When he graduated in 1900, his *Commencement Ode* for baritone, male chorus and orchestra was produced as part of the commencement exercises From 1901 to 1903, he was in Europe, continuing his studies under Thuille in Munich and Widor in Paris In 1903, he was appointed instructor in the theory of music at Yale; in 1909, assistant professor; in 1910, full professor; and in 1920, dean of the Department of Music, succeeding Prof. Horatio Parker. For many years he was also organist at various churches in New Haven In 1917, he became conductor of the Horatio Parker Choir; in 1918, conductor of the Choral Art Club; and in 1919 he succeeded Parker as conductor of the Oratorio Society and the New Haven Symphony Orchestra. His works consist of: two symphonies; a symphonic poem, *Darkness and Dawn;* the overtures, *Joyeuse, Sérieuse,* and *Prince Hal; Symphonic Ballad, Allegro giocoso, Commemoration March, L'Allegero, Il Pensieroso,* and *Impressions; Prelude, Chorale and Fugue* for organ and orchestra; the choral works with orchestra, *The Windswept Wheat, The Fallen Star, The Dark, Pan,* and *Rhapsody of St. Bernard;* two string quartets; a piano trio, anthems; and part-songs and songs

SMITH, FREDERICK EDWIN, first VISCOUNT BIRKENHEAD (1872–). An English lawyer and statesman (see VOL. XXI). He was a member of Parliament from 1906 to 1919. In 1915, he served as solicitor-general and from 1915 to 1919 as attorney-general. During the War he served with the Indian Corps in France In 1919, he was appointed Lord High Chancellor of Great Britain but later resigned that office. He was created Baron in 1919 and Viscount in 1921. He visited the United States in 1916 and again in 1923. His later books include *Destruction of Merchant Ships* (1917); *My American Visit* (1918), and *The Indian Corps in France* (1919).

SMITH, HERBERT BOOTH (1883–). An American clergyman, born at St Louis, Mo., and educated at Princeton Theological Seminary. He was ordained to the Presbyterian ministry in 1909 and held pastorates in Rochester, N. Y, Knoxville, Tenn., and Los Angeles, Cal In the last-named city he ministered to a congregation of 3000. He wrote *Five Sermons on Democracy* (1918) and *The New Earth and Other Sermons* (1920)

SMITH, HUGH MCCORMICK (1865–). An American ichthyologist born at Washington, D. C. He was educated at Georgetown University (M.D., 1888) He was assistant in the United States Fish Commission (1886–92), in charge of the division of fisheries (1892–96), in charge of scientific inquiry (1897–03), Deputy United States Commissioner of Fisheries (1903–13); and Commissioner of Fisheries (1913–22). As deputy commissioner and commissioner of fisheries he directed the activities of the Bureau of Fisheries and published various papers on the commercial fisheries and aquatic resources of the United States

SMITH, JOHN MERLIN POWIS (1866–). An English educator. He was born in London, came to America, and studied at the University of Chicago He was graduate student and fellow of the university (1895–99) and literary secretary to President Wm R Harper (1899–1906). After 1915, he was professor of Semitic languages and literature He is the author of *Biblical Ideas of Atonement,* with E. D. Burton

and G. B. Smith (1909); *Commentaries on Micah, Zephaniah, Nachum and Malachi* (1911–12); *Commentaries on Amos, Hosea and Micah* (1914); *The Prophet and his Problems* (1914); *A Guide to the Study of the Christian Religion*, with G. B. Smith (1916); *Religion of the Psalms* (1922); and has collaborated on Harper-Smith's *Hebrew Method and Manual* (1921) and Harper-Smith's *Elements of Hebrew* (1921).

SMITH COLLEGE. A nonsectarian institution for women at Northampton, Mass., founded in 1871. The enrollment of the college increased from 1638 in 1914 to 2153 in the year 1923–24, the faculty was increased from 146 to 208 members, and the library from 50,000 to 107,000 volumes. Largely through an endowment campaign conducted in 1920, the productive funds of the college were increased from $1,695,892 to $4,264,567. In 1918, a School of Social Work was established, and in 1921 an Experimental School for the Training of Teachers of Retarded Children. Entrance examinations for all students were required, beginning with the fall of 1919. Marion LeRoy Burton was succeeded by William Allan Neilson, Ph.D., LL.D., as president in 1917.

SMITH-LEVER ACT. See AGRICULTURAL EXTENSION WORK; EDUCATION IN THE UNITED STATES.

SMITHSONIAN INSTITUTION. An institution in Washington, D. C., created in 1846 for the increase and diffusion of knowledge among men. Throughout the decade 1914–24, geological explorations were carried on in the Canadian Rocky Mountains by the secretary of the Institution, Charles D. Walcott. He investigated the Lower, Middle and Upper Cambrian formations at Wonder Pass, the great interval of non-deposition of sedimentary rock-forming material along the front range of the mountains west of Calgary, Alberta, and the pre-Devonian strata of Sawback Range as far as the headwaters of the North Fork of the Saskatchewan River. Dr. R. S. Bassler, curator of palæontology, carried on explorations between 1914 and 1921 to determine the geological history of the Appalachian, Ohio, and Mississippi valleys. Frank Springer made collections of fossil echinoderms along the new Erie Canal in western New York State and also in the Ohio valley. Fragmentary remains of a fossil bird related to *Hesperonis* in the Judith River formation were discovered in Montana. Dr. Wherry completed the areal mapping of various formations in Pennsylvania, and a geological survey was made of the Canal Zone in 1914.

Arthur Sowerby went on a zoölogical exploration trip in China and Manchuria in 1917, and was again in that region at the close of 1923. H. C. Raven collected zoölogical specimens in Borneo and in Celebes, Dutch East Indies; collections of corals, birds, cacti, and invertebrates were gathered in the Danish West Indies, east Cuba and Haiti. Two expeditions were sent to Africa. The Collins-Garner Congo Expedition collected many specimens of apes and about 2500 mammals, birds, reptiles, fishes and invertebrates for the National Museum in 1917. The Smithsonian African Expedition, organized under the direction of Edmund Heller, spent 1919–21 in the interior of the continent collecting specimens for use in comparison in working up the collections made in Africa by Theodore Roosevelt, Paul Rainey, and others. Charles M. Hoy directed an expedition to Australia in 1920 and 1921 to study the fauna, which was rapidly being exterminated.

Dr. A. S. Hitchcock made botanical explorations in the Hawaiian Islands in 1917; studied the grasses of the Adirondacks and White Mountains in 1918; conducted an expedition to British Guiana in 1920; and spent several months in the Orient in botanical work under the Department of Agriculture. Dr. J. N. Rose, with the coöperation of the Carnegie Institution, made explorations in South America. Botanical collections were also made in Santo Domingo and Haiti by Dr. W. L. Abbott and Emery C. Leonard, and in Jamaica by William R. Maxon.

The chief of the Bureau of American Ethnology, Dr. J. Walter Fewkes, was engaged during the decade in the excavation and repair of the large prehistoric Indian ruins in Mesa Verde National Park and of ruins in neighboring valleys. Aleš Hrdlička was sent in 1920 to the Far East to pursue his researches on the origin of the American Indian and the peopling of eastern Asia. Anthropological expeditions were sent also to Africa and to Siberia in 1915 and in 1923 to the Paleolithic regions of France and Spain. The American School of Archæology was organized in China in 1914. Prof. W. H. Holmes participated in an exploration by the Carnegie Institution in 1916 of the ancient Maya cities in Guatemala and Honduras, and in 1919 archæological investigations were begun by Philip A. Means in Peru and Bolivia.

The Langley Aërodynamical Laboratory was opened in 1914 for the study of the principles of aerodromics, especially those of aërodynamics, and for research to increase the safety and effectiveness of aerial locomotion. In the astrophysical laboratory a balloon pyrheliometer was designed in 1916 to measure the heat of the sun at high altitudes, and during the 10-year period, great advances were made in the methods of observing the solar radiation, including the establishment of two new observing stations, one in Arizona, the other in Chile. In 1917, F. G. Cottrell invented a method of electrical precipitation of suspended particles which was used commercially by smelting and refining companies.

The Institution continued to publish the results of its investigations, distributing 1,600,000 publications during the 10 years to libraries, educational institutions and individuals. A Congressional appropriation in 1920 made possible the establishment of the National Gallery of Art as an independent bureau under the administration of the Smithsonian Institution The Freer Gallery of Art was established under the administration of the Smithsonian Institution in the year succeeding, under the provisions of the will of Charles L. Freer, who gave it his large and varied collection. The National Museum made great progress during the 10-year period, large additions being made to its collections through gifts, bequests, and transfers from the Federal agencies. Many of the objects in its collections, new to science, were studied and described by the members of its technical staff, and the results were made known through the Museum *Proceedings* and *Bulletins*. See EXPLORATION.

SMOKELESS POWDER. See EXPLOSIVES.

SMOKE SCREEN. See WAR IN EUROPE, *Naval Operations*.

SMOOT, REED (1862–). An American legislator (see VOL. XXI), United States Senator from Utah. He was first elected in 1909 and was reëlected in 1914 and in 1920. He was a member of the Public Lands and Service, the Appropriations, Finance and the Pensions Committees in the Senate. He was conceded to be the first authority on finance and governmental expenditures, and had much to do with the preparation of the various tariff bills passed during his time of service.

SMUTS, JAN CHRISTIAN (1870–). A South African statesman (see VOL. XXI). As commander-in-chief of all the British Imperial forces in German East Africa, he showed great vigor and before the end of 1916 had entirely broken the German power there. He was then summoned to London by Lloyd George for the deliberations of the Imperial War Cabinet, of which he became the only permanent Dominion member. He represented South Africa at the Peace Conference. In 1919, he became prime minister of the South African Union and was faced by the Nationalist agitation led by General Hertzog. At the general election of 1920 he failed to obtain a majority for his party in Parliament. Faced with the necessity of a union with either the Nationalists or the Unionists, he turned to the Unionists, as the Nationalists were unwilling to give up their hopes of a republic. With the Unionists' help, his party, called the South African party, obtained a good majority in the election of 1921. The Labor party and the Nationalists joined forces against him, however, and on June 23, 1924, he was forced to resign and a coalition of the Nationalist-Labor party came into power with General Hertzog as prime minister.

SMYRNA. By the Treaty of Sèvres (Aug. 10, 1920), Greek diplomacy, largely the work of Venizelos, achieved a triumph when this important region of Anatolia (Asiatic Turkey) was assigned to Greece. But it was won only to be lost again, and by the definitive Treaty of Lausanne (July 24, 1923) it reverted again to Turkey. The artificial nature of the earlier settlement, the defeat at home of Venizelos (December, 1920) and the triumph of Nationalist Turkey (1921–22), all contributed toward hastening the downfall of Greek power in Asia. Venizelos, in his memorandum of Dec. 31, 1918 to the Peace Conference, had asked for the creation of an autonomous Smyrna, made up of the Turkish vilayets of Aidin and Brusa; this region, he claimed, was inhabited by Greek majorities and was set off topographically from eastern Asia Minor. But earlier Allied commitments, notably those to France and Italy, prevented the erection of such a territory, with the result that the Smyrna region awarded to Greece by the Treaty of Sèvres was indefensible on ethnographic, economic, and geographical grounds. The Smyrna of the Treaty of Sèvres was made up of the entire sanjak of Smyrna and certain districts of the sanjaks of Manisa and Akhissar. On the north, its frontier went to the Bay of Adramyti, on the south, to Kemer. The zone possessed a population, according to the best 1914 figures, of 1,057,000 divided into 509,000 Greeks, 470,000 Moslems, and 78,000 others. The city of Smyrna, in which the whole region centred, had ranked before the War as the second largest part of the Ottoman Empire and in exports, its trade had surpassed even that of Constantinople. It served a vast hinterland extending east as far as the Ushak and Karahissar uplands, north to the Dardanelles, and south to Adalia. Its railway communications were the best in Turkey, for the Smyrna-Kassaba line connected with Afiun Karahissar on the Bagdad system, and branches ran north and south. This region was, in 1920, created an autonomous Turkish province under Greek administration The treaty required Greece to establish a local parliament in Smyrna with an electoral law to be approved by the Council of the League of Nations. After five years, this local parliament was to have the right, if it desired, to petition the League for the absolute and definitive incorporation of the Smyrna area into the Greek kingdom, but no provision was made for a petition in favor of reunion with Turkey. Practically, the treaty clauses meant that Smyrna was to be under the provisional Greek administration for five years, as a transitional stage, and then to be annexed to Greece. The settlement was attacked, ethnographically, on the following grounds. It did not solve the Greek problem in Anatolia for at least 66 per cent of the Greeks lived outside the zone. Again, it would be impossible to move the other Greeks to this enclave for they consisted largely of traders and the like, and therefore had fixed economic interests in their places of residence. From the economic point of view, the settlement was a poor one because Smyrna was not essentially a Greek city but a great entrepôt of trade linking the West with Anatolia, and seating a commercial class that included French, Dutch, and British merchants and capitalists as well as Greek. As for geography, it was at once recognized that the frontiers, as created, cut across rivers, valleys, and railways, and only in the south followed a natural line of division. The hostility of the Turks to the cynical *Realpolitik* of the Allies in the whole matter of the Greek programme requires no further explanation. Smyrna, originally, had been promised to Italy by the secret agreement of St. Jean de Maurienne (April, 1917); but the reluctance of the Italian people to countenance a costly imperialistic adventure accounted largely for the failure of the Italian government to push its claims or stand in the way of the Greek aspirations. Therefore the Greek occupation of Smyrna at the invitation of the "Big Three" proceeded unopposed (May 15, 1919). But not unopposed by Turkey, for the occupation was attended by dramatic results. Spurred on by Greek excesses in the Smyrna zone and their deep-seated hatred of the Greeks, whom they regarded as inferiors, Turks throughout the whole of Anatolia sprang to their nation's defense, and gave support to the newly organized Nationalist government located at Angora. Both sides mobilized for war, until by 1921 there were 200,000 Turks and as many Greeks under arms. The Powers made little effort to interfere except for an attempt at the London Conference of Mar. 11, 1921, to rewrite the Sèvres clauses respecting Smyrna. Military interference was out of the question, and in May, 1921, the Powers declared their neutrality, and as was at once evident, abandoned the Greeks to their fate. The war in Anatolia was waged during 1921–22 with varying fortunes (see GREECE), and suddenly terminated in September, 1922, when the Greeks fleeing to the coast entered the city of Smyrna to make for their ships. The Allies took over the city on September 8,

the Turks entered September 11, and on September 14 a fire broke out that almost gutted the city and accounted for the loss of thousands of lives. The course of the war had been marked by an unusual ferocity during which the atrocities of the Greeks matched if they did not surpass those of the Turks. In fact, it was even contended that Smyrna had been fired by the Greeks to shake the West out of its apathy. But Europe had looked on the whole Greek adventure askance: the Greeks in Anatolia had complicated the problem of a Turkish peace and had made possible the resurgence of a Nationalist Turkey. Italy had naturally enough disapproved the Greek adventure from the outset, and had made separate amicable bargains with the Turkish Nationalists in 1921–22; France, after the Peace Conference, had looked on Greek aims with unfriendly eye, and had likewise made terms with Nationalist Turkey; while the British government, though at first willing enough to utilize Greece as a pawn in Near Eastern politics had lost enthusiasm after the overthrow of the ingratiating Venizelos, and, in view of French and Italian coolness, was willing enough to see the pawn swept off the board The Greeks were out of Anatolia in 1922, and the strength of Turkey as against the impotence of Greece, made the question of Smyrna's disposition now relatively simple. The ultimate character of the settlement was foreshadowed in the Armistice of Mudania (Oct 10, 1922) between Turkey and Great Britain, France and Italy, which among other things assured Turkey of complete sovereignty over Anatolia. A preliminary step was taken in the Lausanne Agreement (May, 1923) between the Turks and Greeks by which the question of Greek damages in Smyrna was amicably settled on the basis of compensation in Thrace (q.v.). Finally, in the Treaty of Lausanne (July 24, 1923), the Greek loss of Smyrna was confirmed. One of the most brutal, and yet possibly necessary elements rising out of the Greek defeat was the arrangement made for the exchange of Greek and Turkish populations. From August, 1922, when the flood of Greek refugees from Asia Minor began to pour into Greece, into 1924, the process of colonizing Greeks (some 500,000) in the home lands went on steadily. But for the aid rendered by the Refugee Commission which was created by the League of Nations Council and headed by Mr. Henry Morgenthau of New York, the task might well have been insuperable

SNEDDEN, DAVID (1868–) An American educator, born at Havilah, Cal He was graduated from St Vincent's College in 1889 and took postgraduate courses at Stanford and Columbia Universities. For several years he served as principal of schools in California and from 1901 to 1905 was assistant professor of education at Stanford University In the latter year he was appointed adjunct professor of education at Columbia, serving until 1909, when he became State Commissioner of Education in Massachusetts In 1916, he became professor of education in Columbia. Professor Snedden was a member of many learned societies and published, among other works: *Administration of Education for Juvenile Delinquents* (1906); *Educational Administration in the United States* (1908); *Problems of Vocational Education* (1911); *Problems of Secondary Education* (1917); *Vocational Education* (1920); *Sociological Determination of Objectives in Education* (1921). From 1918 to 1920, he was president of the National Society for Vocational Education.

SNOWDEN, PHILIP (1864–). An English public official (see VOL. XXI). During the War he was a member of the Liquor Control Board, and in 1924 he was appointed Chancellor of the Exchequer in Ramsay Macdonald's cabinet. His first budget reduced the customs on sugar, tea, cocoa, etc., and abolished the duties on automobiles. He wrote *Through Bolshevik Russia* (1920) and *A Political Pilgrim in Europe* (1921).

SNOW REMOVAL. See ROADS AND PAVEMENTS.

SNYDER, VIRGIL (1869–). An American mathematician, born at Dixon, Iowa. He studied at Iowa State University, and then held a fellowship at Cornell, after which he studied abroad, receiving his Ph.D at Gottingen in 1894. He returned to Cornell as instructor of mathematics and in 1910 became professor His original investigations include studies on the geometry of the line and sphere, configurations of ruled surfaces, and birational transformations, the results of which he published He became editor of the *Bulletin* of the American Mathematical Society in 1903. Besides various scientific papers, he wrote *Differential Calculus*, with James McMahon (1898); *Differential and Integral Calculus* (1902); *Elementary Text-book on the Calculus* (1912); *Analytic Geometry of Space* (1913). He also edited *Plane Geometry* (1910), and *Solid Geometry* (1912).

SOAPSTONE. See TALC AND SOAPSTONE.

SOCCER. See FOOTBALL.

SOCIAL DEMOCRATIC PARTY. See SOCIALISM, *Germany*.

SOCIAL INSURANCE. An increasingly important phase of social legislation was the application of the insurance principle to various classes of misfortunes that handicap workingmen, to afford relief in case of unemployment, accident during employment, occupational disease, sickness, and invalidity and old age. See WORKMEN'S COMPENSATION; OLD AGE PENSIONS, and MOTHERS' PENSIONS.

The problem of unemployment, in its relation to the worker's welfare, was first attacked on a national scale in Great Britain in 1911, when a compulsory unemployment insurance act was passed, affecting 2,225,000 people in specified trades, and encouraging voluntary insurance in other trades. This scheme was extended to affect 3,725,000 people in 1918; in 1920, to include all over 16 years of age, with certain exceptions In 1922, a compromise plan was under consideration, combining the State plan with one providing for insurance by industry. Administrative cooperation with the labor exchanges greatly minimized the genuine problem of detecting those unemployed because of laziness. In other countries, the measures taken had provided generally either for voluntary funds managed by societies or unions, and compulsory or voluntary municipal funds, subsidized by the state, provincial or municipal governments. The municipal unemployment fund plan was adopted in Italy (1910), Germany and Holland; insurance through subsidized societies was more general in France, Norway, Denmark, Spain (1919), and Switzerland. Switzerland in 1919 adopted a temporary Federal measure providing for unemployment insurance; and in 1920

Italy established a compulsory system. See UNEMPLOYMENT.

Compulsory insurance against sickness and accidents had been established for several decades in Germany, Austria and Hungary. It covered a wide range of occupations. The National Health Insurance Act passed by Great Britain in 1911, which was compulsory, and universal with a few specified exceptions, and provided for sickness, disablement, maternity, medical and sanatorium benefits, was amended several times during and after the War, changing the amounts both of weekly contributions and benefits. In 1912, Switzerland adopted an insurance law covering sickness and accidents, for the latter compulsory, for the former generally voluntary. Italy's compulsory insurance law of 1920 (see OLD AGE PENSIONS) also provided against sickness or accident. Health insurance legislation had been adopted in Poland; and in 1922 such protection was legislated in Latvia and Jugo-Slavia. The question of health insurance received considerable attention in the United States in 1916–18, when commissions were appointed by a number of States to investigate the need and possibilities of such legislation, but the movement met with considerable opposition on the ground that compulsory payment was an infringement of personal liberty, and that sufficient means for health insurance were already available in various friendly orders, unions, corporations, and commercial insurance companies.

SOCIALISM. The history of socialism after 1914 did not bring forth any noticeable change in principle. The great struggle in the socialist ranks during 1914–24 was concerned primarily with tactics, for throughout these years the socialist principle retained its solid Marxian basis. While there was much debate among the three foremost groups, the communists under Lenin, the orthodox socialists under Kautsky, and the "revisionists" under Bernstein, none of these groups ever seriously questioned the fundamental Marxian doctrine. In regard to procedure two distinct camps appeared, the one favoring the attainment of the socialist aim through the dictatorship of the proletariat, and the other striving for the same end by utilizing the existing political and economic institutions. In addition socialism came to lean more and more on organized labor and adopted under the influence of syndicalism, industrial unionism, and guild socialism, tactics of a more strictly industrial character. Tactics, the disruption of international socialism, and the final reconstitution of the International mark the years from 1914 to 1924.

The Socialist International. Early in 1914 plans had been made to hold an International Congress on Aug. 23, 1914, in Vienna for the commemoration of the founding of the International Workingmen's Association 50 years before. This congress was never held because with the outbreak of the War international socialism broke up into its component national parts. The general strike against war was not called in spite of all previous plans for such action, and the War swept international socialism away regardless of individual mass meetings and protests against war in various countries. Most socialists placed their country's needs ahead of their socialistic principles. The Belgian, the French, many of the British, and most of the German socialists supported their respective governments. Only the Russian, some of the British, and a small minority of the German socialists remained passive. During 1915 more or less determined efforts were made to reconstruct the disrupted International, and toward this end a conference was held at the instance of the Scandinavian socialists during January, 1915, in Copenhagen. Only the Scandinavians and the Dutch, 16 delegates in all, attended. In February of the same year the socialists of the Allied countries held a conference in London, which, however, concerned itself with victory rather than with peace and criticized the imperialism of all the warring countries only perfunctorily. More important than either of these two was the conference held at Zimmerwald, Switzerland, in September, 1915, at the invitation of the Italian socialists, at which were present representatives of all the important socialist parties, exclusive of the British to whom passports had been refused This conference emphasized the international solidarity of all socialists and issued a manifesto condemning the War. Nothing definite, however, was accomplished, and the efforts at welding together the broken up International proved equally unsuccessful in 1916. The International Socialist Bureau, which had been removed at the outbreak of the War from Brussels to the Hague and which was now under the direction of the Dutch socialists, held a conference at its seat July 30–Aug. 2, 1916, which was attended by representatives from Sweden, Denmark, Holland, the United States, and Argentina and at which resolutions were adopted placing the responsibility for the War on the capitalist system. The socialists of belligerent and neutral countries, who had convened during the previous year at Zimmerwald, met again in August, 1916 at Kienthal, Switzerland. The majority of the 40 delegates at this conference represented the Italian Official Socialist party, and the Swiss and Russian socialists. Only two Germans and three Frenchmen attended, and hence the conference accomplished very little. Renewed efforts at international unity brought about the so-called Peace Conference of Stockholm in June, 1917 The plan initiated with the Russian Workmen's and Soldiers' Council and found response among the Germans and Austrian socialists who drew up an elaborate peace programme on the basis of "no annexations and no indemnities" Of all the important socialist parties, only the Germans attended, and the conference was therefore an utter failure. More concrete results were produced by the Inter-Allied Labor and Socialist Conference of Feb. 21–23, 1917, at London. It voted a declaration of war aims, commonly called the London Memorandum, which endorsed President Wilson's four principles essential to peace and the British Labor party's programme as to war aims, and advocated a League of Nations. On that basis, however, unity with the enemy socialists was hardly possible at that time. Another Inter-Allied Socialist Congress met in London during September, 1918. A majority resolution approved efforts to aid revolutionary Russia against Germany, while a minority, which wished to go much further in support of the Soviet government, was condemned as pro-Bolshevik. Amid continued attempts during 1919 to revive the disrupted Second International, 12 radical socialist parties met at the instance of the Rus-

sian Soviet government at Moscow, Mar. 2–6, 1919, and formed the Third International, a strictly communist organization. The International Socialist Bureau, the only remnant left of the Second International, summoned the Berne Conference of February, 1919, at which 26 countries were represented. The Conference settled a number of points of conflict and expressed its opposition to the Communist International. In the following August the committee for the reconstruction of the Second International held a session at Lucerne, at which further progress was made and a congress for the following year was decided on. At the Congress of Genoa, August, 1920, international socialism was finally reconstituted after six years of discord. The organization was, however, by no means complete, for many socialist units remained outside its fold. The Congress declared emphatically against the acts and programme of Lenin and Soviet Russia and adopted in the main British Labor party features and principles. A score of socialist parties attended the Conference and affiliated with the new international body. Amsterdam was chosen as the permanent seat. The Third International held a Congress at Moscow in 1921 which was attended by several hundred delegates from 42 countries. The result of this meeting was the maintenance of the Soviet doctrine in all its purity Socialist groups that were opposed both to the nationalist tendencies of the Second International and the centralism and exclusive communist character of the Third International organized in Vienna, Feb. 2, 1921, the International Working Union of Socialist Parties, or, as it was commonly termed, the Second and a Half International The chief adherents of this body were the Independent Labor party, the German Independent socialists, the Socialist party of France, the Austrian, Swiss, and Rumanian socialists, and the Russian Mensheviks. This intermediary organization soon manifested a desire, however, to coöperate with the other Internationals, and at its instance a conference of the three Internationals was held in the Reichstag building in Berlin, Apr. 2–5, 1922, at which a basis for common procedure was discussed While the Conference and the subsequent meeting of its Committee of Nine, Berlin, May 23, 1922, ended in failure as far as the Moscow International was concerned, it succeeded in bringing the other two organizations closer together. This rapprochement continued during the remainder of the year and at the meeting of the executives of the two bodies at The Hague, Dec. 10, 1922, it was decided to call a congress at Hamburg for May 20 of the following year, in order to bring about united socialist action. At this congress 424 delegates from 30 countries, representing 43 socialist parties or groups, were present. The Vienna International and the Second International merged and formed the Labor and Socialist International with its permanent seat in London. Thus the socialist parties of the world, with the exception of the communist groups, were united for the first time since August, 1914. The new organization and the Third International continued their hostility to each other.

France. The elections of 1914 increased the number of seats of the socialists in the French Chamber to 101. The outbreak of the War found the French socialists giving uniform support to their government. They regarded the War as a war of defense on the part of France and dropped the antimilitarist plank from their platform. During 1915 and the greater part of 1916 they continued this solid indorsement of the government, but late in 1916 a steadily growing minority element sprang up which opposed the War At the Socialist Congress of Bordeaux, October, 1917, it became apparent that the majority had swung over to the minority viewpoint; but a fusion of the two groups did not take place, since no agreement could be reached on the question of war credits. In April, 1919, the French Socialist party voted to remain in the Second International, protested against the Peace Treaty of Versailles, and condemned the League of Nations. At the elections of 1919 it polled 1,750,000 votes, a gain of 40 per cent, but its representation in the Chamber was reduced to 55 seats. In 1921 the communist element seceded from the Socialist party and founded an independent organization, which polled 321,444 votes against 578,466 for the socialists, in the elections of May, 1922. At its national congress at Lille, 1923, the French Socialist party rejected a proposal from the communists for united action against the occupation of the Ruhr and the danger of an imperialist war. On the same occasion it voted for recognition of Russia. In the May elections of 1924, it increased its membership in the Chamber from 55 to 101 seats. With the secession of the communist element, the party became more moderate, this being manifested by its apparent willingness to support a Radical Socialist government, without, however, actually participating therein. See COMMUNISM.

Germany. While the War was still imminent, the German socialists voiced their protest against it in organized mass meetings, but once war was declared the Social Democratic party in the Reichstag, with a few exceptions, supported the government and voted the war credits. As the War progressed, dissatisfaction with the party's attitude toward the government and the War appeared in the Reichstag group and, although few in numbers during 1914 and 1915, the dissenters were strong enough in 1916 to break with the party and form a new organization, the Socialist Union of Labor, which mustered 20 members in the Reichstag and adopted a programme uncompromisingly opposed to the War. Thus the conflict between internationalism and nationalism had split the great German Social Democratic party. During 1917, the new organization grew in strength and called itself the Independent Social Democratic party. It demanded immediate peace and branded the War as capitalistic throughout, while the adherents of the old party, now called the Majority Socialists, supported the government and sought internal economic and political reforms and a peace honorable to Germany. With the disastrous close of the War, and the revolution, the Majority Socialists took over the government. When the Independent Socialists seemed to be willing to support them, a minority among them, which had been most outspoken in its hostility to the War, seceded and expressed sympathy with the Soviets. The Spartacists, as these ultraradicals called themselves, began an uprising in January, 1919, which was forcibly suppressed by the Majority Socialist government. As a result of the elections of 1919, the government passed completely into the hands of the Majority Socialists, but

the Independents made also considerable gains. Of the three socialist groups which thus existed in Germany, the Majority and Independent Socialists favored the Second International and the Spartacists the Third International. In October, 1920, however, the Independents pronounced their adherence to the Moscow body. At their annual national congress at Goerlitz in September, 1921, the Majority Socialists decided to coöperate with the bourgeois parties. In September, 1922, in the Convention of Nüremberg, the Majority Socialists and the Independents combined into the United Social Democratic party. A small minority of the Independents held aloof and joined ultimately the communists. The Reichstag group of the communists joined in 1923 the Reichstag group of the United Socialists and formed with some of the former Independents the left wing of that party, but in the Reich the socialists lost many members to the communists. This leftward trend within the socialist rank and file became clearly apparent in the elections of May, 1924, when the seats in the Reichstag of the United Socialists were reduced from 166 to 100, while the communists obtained 60 seats against 15 in the old Reichstag. As a result of this leftward movement and of the great Nationalist gains, the active or passive participation of the socialists in the government was doubtful in the summer of 1924.

Great Britain. Early in 1914, the three outstanding British socialist societies, the British Socialist party, the Independent Labor party, and the Fabian Society, drew up a plan for closer coöperation, but here, as elsewhere, socialist progress was checked by the advent of the War. In England, as in Germany, there was at first organized socialist protest against the War. This changed once the conflict had become a reality. The Labor party, only partially socialist in character and composition, gave full support to the government while the Independent Labor party remained aloof. Thus, on the whole, British socialism and the Labor party remained loyal to the government throughout the War (except for a group of British socialists) and in the closing years of the struggle socialist members of the Labor party accepted posts in Lloyd George's War Cabinet. After the War, in 1919, unsuccessful attempts were made to bring together the British Socialist party, the Independent Labor party, and the Fabian Society. There had been a fourth group, the former Social Democratic Federation, now called the National Socialist party, which in 1920 assumed its old name and joined the Labor party. The latter, still only partially a reflection of socialist views and principles, became in the post-war period increasingly socialist in character and its gains in the elections of 1919 were regarded as socialist gains. In 1920, it expressed itself as opposed to the Third International. At the same time the radical British Socialist party became the British Communist party (see COMMUNISM) and was joined by the Socialist Labor party, an offshoot of the American Socialist Labor party. Towards the end of the War, guild socialism (q.v.) and syndicalism, (q.v.), two nonpolitical and strongly industrial movements, began to exert an ever increasing influence on British socialism and in the post-Armistice years these movements became even more powerful. The elections of 1922 made the Labor party, with 142 members in the Commons, the chief party of opposition and after the elections of 1923, which increased its strength to 191 seats, the Labor party took over the government with the passive support of the Liberals. The Labor party was affiliated with the Labor and Socialist International of which it was the leading spirit.

The United States. The American Socialist party lost rather than gained during 1914. Although it elected Meyer London to Congress, it polled at the November elections over 200,000 votes less than in 1912. During 1915, there was a great deal of strife in the party over the nonparticipation of the American socialists in the Copenhagen Conference. The party was rather successful in that year in electing candidates to State and local offices. At the presidential election of 1916, however, it polled over 150,000 votes less than in 1912. America's entrance into the War in 1917 had the same disrupting effect on the American Socialist party that the War had had on the socialist parties of other countries. After endeavoring in vain to have the party repeal its expression of opposition to the War, a patriotic group seceded and formed the Social Democratic League in 1918. During the same year the American government suppressed many antiwar activities of the socialists by imprisoning a number of them, including Eugene Debs. New factional disputes arose in 1919 after the Chicago Convention, at which the party declared in favor of the Third International. The radical elements left the party and formed the groups subsequently known as the Communist party and the Communist Labor party (see COMMUNISM) Thus the American Socialist party lost considerable influence due to its middle-course policy. On the one hand it alienated the more conservative elements, while on the other hand it lost those who were communist in sympathy and wished to stand squarely on the Moscow programme. In 1920, the American socialists took a definite stand against Moscow by insisting on using their own judgment as to their principles and tactics. That year was also marked by the suspension of the five socialists elected to the New York State Assembly. When these were reelected, three of them were again suspended in December of the same year. At the national elections in 1920, the party polled about one million votes. In 1921, the sentences of Debs and a number of other socialists, imprisoned during the War under the Espionage Act and other war-time measures, were commuted. At the Convention of 1922, the Socialist party voted for affiliation with the Vienna International and for unreserved recognition of Russia. In Wisconsin the Socialists sent Victor Berger to Congress in the elections of 1922, while Daniel W. Hoan became mayor of Milwaukee for a third term. In New York City the Socialist party joined in the elections with The Farmer-Labor party to form the American Labor party. An invitation from the Workers' party, the successor of the Communist party, for coöperation in various matters was rejected unanimously at the annual convention, May 19–23, 1923. In the elections of the same year the Socialist party in New York City cooperated again with the Farmer-Labor party. The American Socialist party was represented at the Unity Conference of the Vienna and London Internationals and affiliated subsequently with the Labor and Socialist International.

Italy. The Italian Socialists were opposed to

the War and voiced their protest against it in various ways, making plain their hostility even after Italy's entry and throughout the duration of the War. The post-war period saw the same internal dissension in the Italian party, communists and reformists forming separate organizations. The growth of Fascism weakened the socialist movement, the elections of May, 1924, indicating a marked retrogression.

Russia. The Russian socialists were almost uniformly opposed to the War and suffered severe persecution from the Russian government. For further details see COMMUNISM.

SOCIAL PSYCHOLOGY. Like all the new sciences, social psychology had to struggle against the tendency to conceive science on the literal model of mathematical physics It is hard for the human mind to escape the fascination of rigid laws and absolute predictability, even when such a prospect destroys the very purpose of the scientific research If social psychology were reducible to a mechanical system, it would be a monstrosity, and no one would be interested to study it. And yet because the scientific intelligence, in its ordinary workings, divides and classifies into pigeonholes, more than one social psychologist found himself embarking on vain constructions until he was awakened by the complexity of the subject matter.

In this connection, a short regression into the history of social psychology is instructive The new science was called into being to supplement the science of individual psychology The latter science, being investigated on an experimental, physiological basis, was powerless to bring together the complex facts and tendencies of human life, and it was therefore necessary to add a new member to the intellectual encyclopædia. But no sooner was this member added than the problem came up of finding a specific method for it By scientific method most persons understand positive method, a method that gives results that anybody can understand without the necessity of a cultural initiation or direct sympathy. But it was the insistence upon such a positive and objective method that had impoverished the science of individual psychology and had robbed it of all the hopes aroused by the literary psychologists and the authors of the naturalistic novel. A similar insistence was bound to bring about an analogous disappointment with social psychology.

The best illustration of this development is to be found in the writings of Wilhelm Wundt For nearly half a century, the director of the Leipzig laboratory dominated the science of psychology in Germany. In his later years he turned from individual psychology to *Volkpsychologie*, but he continued to apply the same "structural" formula—the search for elements and laws. He defined the social mind as an individual synthesis possessing actuality, although in his physiological psychology actuality was regarded as immediacy of experience and was therefore personal. Moreover, in dealing with the group mind as a synthesis, Wundt entangled himself in the same difficulty as in his apperceptive synthesis of the individual mind. The apperceptive synthesis was a union of psychophysical sensations, and yet it had a reality over and above its component atoms.

So, too, the group mind was a synthesis of individual minds and seemed to have a substantial existence of its own. Wundt held that the attributes of the group mind were to be determined by the analysis of its products; thus the attributes of the German mind were to be formulated by an analysis of the collective acts of the German people, those of the French mind by an analysis of French acts, etc But in practice Wundt's laws of folk psychology were but applications of individual psychology; just as in practice his analysis of immediate psychological experience tended to be degraded more and more into mere physiology.

In Germany, Wundt's folk psychology met the opposition of those who approached collective phenomena from the study of history and the evolutionary development of peoples. Krüger was the leader of this group—the school of *Entwicklungspsychologie* or developmental psychology of groups. The conflict paralleled the historic quarrel in France between the objective sociologists and psychologists like Gabriel Tarde who hoped to explain all social phenomena through the mechanism of the instinct of imitation.

In the United States and in England, the issues were never so sharply drawn; for one reason, because no rigorous discipline was developed for the study of social facts McDougall's *Social Psychology* served for many years as a model for all students of the subject. Its method was thoroughly empirical—empirical, that is, in the British sense, without being objective. Inspired largely by the *Dynamic Sociology* of Ward, Professor McDougall had undertaken to put into relief the component individual motivations which go to make up the movement of life which we call society. Because this system of motivations was elaborated in the form of a textbook treatise instead of a novel, as Thackeray's *Vanity Fair*, both the author and his critics tried to judge the work as objective science in the manner of physics. Professors disagreed as to the number of instincts and inherited dispositions man possessed at birth; whether these instincts were immutable or could be propitiated by a favorable environment; and finally as to the relation of these instincts to ethics and religion. Some even attempted to verify the existence of the instincts by the aid of a physiological microscope and discovered only simple and conditioned reflexes.

It is significant that in setting about to study the same social phenomena from another angle, Professor McDougall arrived at the conception of a *group mind.* Such a conception is, after all, another way of expressing the literary notion of a national genius, or a national spirit, with fairly definite characteristics. The difficulty comes in the attempt to put such conceptions on the level of objective visibility and precision, and the difficulty is involved in the very notion of objectivity. We may, in this connection, qualify as objective any judgment which remains true or is capable of becoming true for all men regardless of their psychological motivation, or their personal or moral caprice. Such a definition, it is obvious, applies only to the world of matter and the world of numbers. When we step outside of these relatively simple fields, we are compelled to rely on metaphors—metaphors which are more or less adequate to the artistic task of expression. A recognition of this fundamental relationship between the objective and the nonobjective at once clarifies

the task of the social sciences, and indicates a natural division between social psychology, sociology, and practical ethics.

The simplest field of the three is sociology, or the study of social statics. This science deals with facts and figures which do not lie but which are quite misleading when they are regarded as the whole story. The function of social psychology, on the other hand, is to organize a marionette show capable of explaining and interpreting any set of objective statistics that we may pick. Social psychology, then, cannot be a rigorous science that can be added to, brick by brick. It is rather an imaginative conception of a hypothetical structure, and gives as it were the local color setting to the drama of practical action Whether we call this action applied sociology or applied social psychology, or social ethics, does not really matter, so long as we do not presume by any theoretical or imaginative schematism to close the system of experience and shut out the necessity or the possibility of practical action. Of the two theoretical sciences, sociology is the more objective, the more universally true; but for that very reason, the practical applications of sociology are less deducible from the data and more dependent upon what Prof Roscoe Pound calls "the prerogatives of the expert" But in the case of social psychology, its imaginative schematism is something already interpretative and subjective, something already foreshadowing a practical goal. Thus Professor McDougall's *Social Psychology* contains within it a morality; as does also the more daring and imaginative treatise of Mr. Trotter Professor Dewey's *Human Nature and Conduct* is frankly couched in terms of a pragmatic idealism, and for that reason the analysis and discussions are instructive even to those who do not accept all the premises of that philosophy.

If our characterization of the essence of social psychology is correct, it follows that it cannot be taught in the dogmatic manner of textbooks. And yet because of the insistent demand for positive principles, more textbooks were written during the decade under consideration than works of a stimulating intellectual character. The behavioristic revolt in general psychology led to a similar manifestation in our field, and there was more than one attempt to simplify the complexities of social life to the mechanism of stimulus and response. Such a scheme gives only an imitation of knowledge and does not bite into the actual movement of things. M. Bergson has said that the human intelligence, as it comes out of the hands of nature, is capable of dealing only with the unorganized solid. Such a judgment goes far to explain the naïve constructions produced by some of the students of the youthful science of social psychology. They went at the science with heavy marching boots and failed to understand the subtleties involved in human culture.

It should be remembered that the social sciences all took their rise as part of a reaction against polite literary culture, with its conventional phrases and moral homilies. This reaction was born of an excessive faith in the methods of physical science, which was set up in opposition to humanism. The social sciences were to replace cultural studies and were to give a positive solution to the problems which cultural tradition had been able to pose only in vague terms. Now despite the exaggerated tendencies of the new sciences, they have had a salutary effect in toughening our cultural values. In teaching us to resort to conscious reflection and analysis instead of to react passively to the suggestion of traditions, they have done their task well. Where they have failed is in not always applying the artistic finesse necessary to the subject. This is the future task of social psychology.

SOCIETY ISLANDS. See PACIFIC OCEAN ISLANDS.

SOCIOLOGY. See SOCIAL PSYCHOLOGY.

SOIL. The highly important rôle which colloids play in soils was emphasized by investigations, and much new light was thus thrown on the physical and chemical properties of soils. The colloids, which appear to be not a group of substances but matter reduced to a certain degree of fineness, have been shown to occur in soils in larger proportions than was formerly realized, and to modify profoundly their absorptive power for water and other constituents, flocculation and deflocculation, and solution and precipitation of soil constituents. The soil survey of the United States now covers over 750,000,000 acres, as compared with 489,000,000 acres in 1914. It furnishes in large measure the fundamental data necessary for classifying the tillable lands with reference to fertility and crop adaptation.

Bibliography. The following books on soil cover recent investigations and new material. T. L Lyon and H. O. Buckman, *The Nature and Properties of Soils* (New York, 1922); Sir A. D Hall, *The Soil*, 3d ed (London, 1920); M. Fleischer, *Die Bodenkunde*, 5th ed. (Berlin, 1922); Edward J Russell, *Soil Conditions and Plant Growth*, 4th ed (London and New York, 1921); Sir John Russell, *Farm Soil and Its Improvement* (London, 1923); F. E. Bear, *Soil Management* (New York, 1924); H H. Bennett, *The Soils and Agriculture of the Southern States* (New York, 1921); F. V. Coville, *The Agricultural Utilization of Acid Lands by Means of Acid-Tolerant Crops* (U S Dept of Agr *Bul. 6*, 1913); Sir E. John Russell, *The Micro-organisms of the Soil* (London, 1923); Edmond Kayser, *Microbes et Fertilité du Sol* (Paris, 1923); P. Ehrenberg, *Die Bodenkolloide*, 3d ed (Dresden and Leipzig, 1922); F. S. Harris, *Soil Alkali* (New York, 1920). There are two scientific periodicals devoted entirely to soils; viz, *Soil Science* and *Internationale Mitteilungen fur Bodenkunde*, and certain aspects of the subject are dealt with extensively in *Journal of Ecology*, as well as in the older agricultural periodicals

SOISSONS. See WAR IN EUROPE, *Western Front*.

SOKOLOV, NIKOLAI (1886–). An American violinist and conductor, born at Kiev, Russia. Having received his first instruction from his father, he entered the Yale University School of Music in 1899, studying the violin under C. M. Loeffler. In 1903, he became a violinist in the Boston Symphony Orchestra. His career as a virtuoso began in 1911 with a tour of England and France. For a time he lived in San Francisco, where he organized a string quartet in 1916 and made his début as conductor with the Philharmonic Orchestra there, which he conducted during the summer of 1916. In 1918, he became conductor of the Cleveland Symphony Orchestra, which he brought to a high degree of efficiency. He also

appeared as guest conductor with several of the great American orchestras and with the London Symphony Orchestra. In 1919, he formed a string quartet with Edlin, Kalodkin and de Gomez, members of the Cleveland orchestra.

SOLAR CONSTANT. See ASTRONOMY; METEOROLOGY.

SOLAR SYSTEM. See ASTRONOMY.

SOLF, WILHELM (1862–). A German public official, born in Berlin. He was much interested in the Oriental languages, studied Sanskrit, and lived a long while in Calcutta. Returning to Germany, he studied political science and was appointed governor of German Samoa in 1900 and German colonial secretary in 1911. He achieved much success in the reform of German colonial administration. He was appointed secretary of state for foreign affairs in October, 1918, and in this capacity conducted the negotiations for the Armistice. He continued to hold this office under the revolutionary Socialist government until December, 1918, when he resigned. Later he was appointed ambassador to Tokyo. He wrote *Weltpolitik und Kolonialpolitik* (1918) and *Kolonialpolitik, Mein Politisches Vermachtniss* (1919).

SOLOMON ISLANDS. See PACIFIC OCEAN ISLANDS.

SOLS. See CHEMISTRY, PHYSICAL.

SOMALILAND. A British African protectorate comprising the Somali Coast on the Gulf of Aden, extending from Labadu to Bandar Ziyada. Its area is 68,000 square miles; its population about 300,000, for the most part Mohammedan and nomadic in character. The chief towns had, by the 1921 census, the following populations: Berbera, 30,000; Zeyla, 7000; Bulhar, 7300. The exports were largely pastoral in nature, i.e. skins and hides, cattle and sheep. The imports were foodstuffs and textiles. Exports for 1921 were £317,659 as compared with £216,596 in 1913–14. Imports for 1921 and 1913–14 were £349,003 and £238,218. Expenditures still continued in excess of revenues and imperial grants-in-aid were necessary to make up deficits. Revenues for 1921–22 were £120,405 (largely from customs); expenditures, £263,128. In 1921–22, a grant of £100,000 was made in the form of a loan. Transport still depended for the most part on the camel. In 1920, the Mullah Mahommed, who for 20 years dominated the interior and consistently fought off the attempts at British penetration, was completely broken when an attack from the air by British aëroplanes wrecked his camp and killed great numbers of his followers. He himself died in hiding soon afterward, and with him passed the power of the dervishes. British rule was thus triumphant.

French Somali Coast. A French colony lying between Italian Eritrea and British Somaliland on the Gulf of Aden. Area, 5790 square miles; population (estimate of 1921) 208,000. Jibuti, the largest town in 1921 had 8366 inhabitants of whom 354 were Europeans. Chief exports included hides and skins, ivory, salt, and fish; total in 1921, 109,361,080 francs. Chief imports were cotton goods and foodstuffs; total in 1921, 129,840,325 francs. A large share of the trade was in transit to and from Abyssinia via the railway from Jibuti to Addis-Abeba (590 miles). The influence of the railway (completed in 1917) on trade was seen in the increased tonnage entering Jibuti. In 1912, 247 ships of 737,748 tons entered; in 1921, 484 ships (307 French) of 1,529,989 tons. The local budget for 1922 balanced at 4,595,000 francs. As a result of the enlightened colonial policy the natives continued orderly.

Italian Somaliland. A colony and three protectorates of Italy extending along the east coast of Africa from British Somaliland to the Juba. Area, 139,430 square miles; population about 450,000. Mogadiscio, the capital of the colony, had 16,000. Attempts were made in the south, in the colony, to turn the native Somali from pastoral pursuits toward agriculture. In 1922, under the Duke of Abruzzi, 7500 acres were put under cotton. In the north, however, the native products continued to be cattle, sheep and skins. Exports for 1921 were 12,130,000 lire; imports, 71,112,000 Leading imports were cotton goods, sugar, rice, petroleum, yarn. Leading exports were hides (from 75 to 80 per cent), dura, maize, gum, butter, cotton The budget for 1922–23 called for revenues of 19,664,000 lire of which 8,422,000 lire was to be an imperial contribution. The military expenditure was to be 3,281,700 lire to maintain an armed force of about 3000 men. There were no railways. Mileage of roads in 1922 was 1135 miles Communications were maintained by 13 wireless stations. A wireless station at Mogadiscio was in touch with Italy via Massawa By the secret treaty of 1915, to facilitate Italy's entry into the War, Great Britain promised to augment Italy's territories to the right of the Juba River in order to assure Italian control of this important watercourse. By 1924, however, no settlement had been reached because of Italy's excessive demands. See AFRICA, *History.*

SOMME, BATTLES OF THE. See WAR IN EUROPE, *Western Front.*

SONIC SOUNDING. See NAVIGATION.

SONNINO, SIDNEY, BARON (1847–1921). An Italian statesman (see VOL. XXI). He was asked by Premier Salandra in 1914 to take charge of the foreign office. His conduct of the office showed wide knowledge of international affairs, patriotism, and high principles. He also acted as foreign minister under Orlando during the Peace Conference, which he attended as second Italian delegate from January 18 to June 19, 1919, when he retired on the Orlando cabinet's going out of office. Sonnino was blamed in some quarters for the Allies' policy toward Italy at the Peace Conference. He was later made a senator.

SOREL, GEORGES (1847–1922). A French engineer and social philosopher (see VOL. XXI) During the War he temporarily left the syndicalist ranks and seemed to accept the ultranationalistic philosophy of Maurras. The Russian Revolution, however, brought back his faith in social reform through violence, and in a new edition (1920) of his celebrated *Réflexions sur la Violence* he included a brilliant plea for the Russian dictator Lenin. Among his writings published since the War is a collection of essays under the general title *De l'Utilité du Pragmatisme* (1919).

SOROLLA Y BASTIDA, JOAQUIN (1863–1923). A Spanish painter (see VOL. XXI). His work for the Hispanic Society of America, which included a series of portraits of Spanish writers and a "Panorama of the Forty-Nine Provinces of Spain," was finished in 1920, and was the last work done before he became paralyzed.

SOSMAN, ROBERT BROWNING (1881–). An American physicist, born at Chillicothe, Ohio. He studied at Ohio State University and received his Ph.D. (1907) at the Massachusetts Institute of Technology. During 1906–08 he was at the laboratory of the A. D. Little Company of Boston, but in 1908 entered the service of the Geophysical Laboratory of the Carnegie Institution in Washington as assistant physicist; he was physicist (1911–18) and acting director (1918–20). He was consulting chemist of the nitrate division of the Ordnance Bureau of the United States Army during the War. His special investigations included studies of the electromotive force of solutions, conductivity and ionizations of aqueous solutions 0°–300°, specific volume of minerals at fusion temperatures, and other similar topics pertaining to mineral chemistry and physics.

SOUND. See AUDITION; PSYCHOLOGY, EXPERIMENTAL.

SOUNDING, DEEP-SEA. See NAVIGATION.

SOUND RANGING. See PHYSICS

SOUTH, UNIVERSITY OF THE. An institution founded at Sewanee, Tenn., in 1857, under the auspices of the Protestant Episcopal Church. The student enrollment increased from about 160 in 1914 to 272 in the year 1923–24 and 44 in the summer session of 1923, the members of the faculty increased from 20 to 25, and the library from 35,000 to 40,134 volumes. The productive funds were increased from $400,000 in 1914 to $1,368,639 in 1923, largely through an endowment campaign carried on in 1919, and the income from $125,000 in 1915 to $279,650 in 1923. A new stone dormitory was opened in 1921, and courses in forestry were added to the curriculum in 1923. Benjamin Ficklin Finney succeeded Albion Williamson Knight, D.D., as president in 1922.

SOUTH AFRICA, UNION OF. A self-governing British Dominion, constituted by the South African Act of September, 1909, as a legislative union, comprising the provinces: The Cape of Good Hope, Natal, Transvaal, and the Orange Free State. Total area: 473,089 square miles. Total population, in 1921, was 6,928,580 as compared with 5,973,394 in 1911, a gain of 15.99 per cent Whites increased from 1,276,242 to 1,519,488, a gain of 19.06 per cent. In 1921, Europeans included 21.93 per cent of the total population. Of the white population (1921), 847,508 were classed as urban and 671,980 as rural; urban colored numbered 888,177 and rural 4,520,915. The provincial censuses showed:

	Area Square miles	Total population 1911	Total population 1921	Increase per cent	European population 1911	European population 1921	Increase per cent
Cape of Good Hope ..	276,966	2,564,965	2,782,719	8.49	528,377	650,609	11 72
Natal	35,284	1,194,043	1,429,398	19.71	98,114	136,838	39 47
Transvaal	110,450	1,686,212	2,087,636	23.81	420,562	543,485	29.23
Orange Free State ..	50,389	528,174	628,827	19.06	175,189	188,556	7.63
Total	473,089	5,973,394	6,928,580	15.99	1,276,242	1,519,488	19.06

There were 115.92 white males to 100 white females in 1911 and 106.05 to 100 in 1921. The following record the marriage, birth, and death rates of whites, per 1000 of the white population for 1913 and 1921: marriage rate, 9.08 and 8.48; birth rate, 31.68 and 28.42; death rate, 10.27 and 10.41. Principal towns in 1921 were: Johannesburg, Transvaal, 288,131 of which 151,836 were white; Cape Town, Cape of Good Hope, 207,404 of which 113,302 were white; Durban, Natal, 146,310 of which 57,095 were white; Pretoria, Transvaal, 74,052 of which 45,361 were white; Port Elizabeth, Cape, 46,094 of which 25,982 were white; East London, Cape, 34,673 of which 20,374 were white.

Religion and Education. In 1918, whites professed the following faiths: Dutch churches, 800,178; Anglicans, 265,149; other Protestants, 200,673; Catholics, 55,552; Jews, 58,741. In 1913 there were 4286 schools for whites with 203,421 pupils which increased by 1920 to 4746 schools with 303,255 pupils; in 1913 there were 2363 schools for colored pupils with 167,708 pupils which increased by 1920 to 3129 schools with 238,137 pupils. Expenditure for education increased from £2,268,026 to £5,940,037. Primary and secondary education were controlled by the four Provincial Administrations. In 1921 there were nine institutions of higher learning with 3292 students and 378 instructors. In 1918, the University of the Cape of Good Hope was divided into three universities, viz., University of Cape Town, University of Stellenbosch, University of South Africa. The other six institutions became constituent colleges.

Agriculture. This industry made great advances during the decade 1911–21, partly as a result of the stimulus of high prices during the War, but as much because of the enlightened interest manifested by the Union agriculture department which coordinated the activities in all four provinces. The maize crop increased from 863,252 tons in 1911 to 1,334,724 tons in 1921. Similarly wheat increased from 181,032 tons in 1911 to 228,401 tons in 1921. The 1918 crops were 304,485 tons wheat and 1,264,009 tons maize. Other crops included oats, barley, kaffir corn, potatoes, citrus and deciduous fruits, and tobacco. Droughts and locusts were frequent, those of 1919 having been particularly severe. Cotton culture gained in popularity. In 1910, 22 bales were produced; in 1920–21, 7153 bales (500 pounds each). In 1920–21, Transvaal's cotton acreage was 16,144, yield 5405 bales; Natal, acreage 2764, yield 1725 bales. In Natal the growing was concentrated in the Pongola Valley (250 miles from Durban) and was thriving because of the abundance of cheap native labor. Sugar, in Natal and the native reserves, yielded 1,627,403 tons in 1920–21. Tea and tobacco showed little or no advances. The pastoral industries ranked high in importance. Stocks increased from 1911 to 1921 as follows: sheep, 30,656,000 to 31,729,512; cattle, 5,796,000 to 8,557,089. In 1921, there were 920,468 horses, 261,828 ostriches, 7,836,696 goats, 914,769 pigs. Wool production, measured in exports, showed gains. In 1913, 176,971,000 pounds were exported; in 1922, 209,783,144 pounds. Mohair (derived from the Angora goat) maintained its important position. In 1922, 25,792,749 pounds were exported. Prices fluctuated wildly, dependent on the demand in England, and the competition with Turkey. In

1921, the value of the mohair exported was £583,643; in 1922, £1,152,470. By 1921, the Union was self-sufficing as regards its meat and dairy supplies and was even beginning to export considerable quantities of both Ostrich-farming, which had been hard hit during the War, recovered to some extent after the Armistice. The great yield of 1913 of 1,023,000 pounds of ostrich feathers glutted the market so that production during the ensuing years dropped. By 1922, only 303,692 pounds were exported. The number of ostriches dropped off almost two-thirds Irrigation projects from 1912 on became the interest of the government In 1921–22, a total of £1,010,000 was spent. In 1922, the works in the Lake Mentz region along the lower course of the Sundays River were opened. These serve 4900 acres. The project aimed ultimately to reach 40,000 acres. In 1921, the total area under irrigation was 808,899 acres.

Manufacturing. The War gave an impetus to local industries The number of establishments increased from 3998 in 1916 to 7005 in 1921. Leather tanning extract, tobacco, cement showed the greatest advances. Value added to products by manufacture in 1921 was £40,343,000, gross value of manufactured products, £98,308,000 Average number of persons employed was 179,819 of which 62,962 were whites. Local industries were encouraged by tariffs and rebate during 1914–19, and from 1921 on the government applied itself to aiding industrial developments. Bounties were offered for pig iron manufactured, for steel produced from native ores, and for meat exported

Mining. The gold-mining industry was the dominating factor in the economic life of the Union of South Africa. The 40 large-scale producing mines had an output of 9,133,060 fine ounces in 1923, a figure which was only reached once before in the history of the industry—in 1916, when it was 100,000 ounces greater—although in the three years of 1912, 1915 and 1917, the total was slightly more than 9,000,000 ounces. The official valuation of the gold output as declared by the Transvaal Chamber of Mines for 1923 was £40,178,170, which represented an increase of £8,000,000, or 26 per cent, over 1922. The £40,000,000 level was exceeded in only two previous years—1920, when the total value was £44,705,384 and 1921, when it was £42,529,396 A large measure of the prosperity of the gold-mining industry prior to 1923 was due to the gold premium, which amounted to £1,383,397 in 1923; £2,069,031 in 1922; £8,323,954 in 1921; and £10,080,009 in 1920 Owing to the fact that the United States was in 1924 the only free gold market, the rate of exchange on New York was the measure of the premium which gold commanded over British and South African currency. Early in 1922, the diamond mines resumed production, after nearly two years of idleness. In the first six months of 1923, 755,200 metric carats were produced, or more than in the entire year of 1922. The coal mines were making a slow recovery, and copper mines were again operating. The total value of the principal minerals produced in the Union from the earliest dates of existing records to Dec 31, 1922, was £1,060,602,350 Of this, gold represented 71 per cent, diamonds 21 per cent, coal 5.4 per cent For 1922, the total mineral output was valued at £38,614,081 as compared with £52,025,840 in 1912, and £68,332,127 in 1920. The fall in value was due to the drop in diamond output caused by the world-wide depression following 1920. In 1919, £11,734,495 in diamonds was mined; in 1921, £3,103,448; in 1922, £2,266,631. Coal production increased from 7,594,944 tons in 1911 to 11,396,905 tons in 1921. In 1922, coal mined was 9,725,479 tons. Most of this was used in the gold and diamond mines, but a considerable quantity was being exported via Delagoa Bay, mainly for bunkering purposes (1,477,654 tons in 1922). Diamonds were found principally in the Cape Province and in the Transvaal; gold in the Transvaal; coal in Natal and the Transvaal; copper in the Cape Province; tin in the Transvaal. Other minerals of importance besides those mentioned were: asbestos, coke, lime, salt, silver, cement, etc.

Commerce. The following are total import and export figures for selected years:

	1911	1919	1922
Imports ...	£38,035,000	£50,791,000	£51,557,371
Exports . .	£57,308,000	£104,561,000	£60,333,755

The depression of 1921 and 1922 is reflected in the above. Leading imports were, in 1922, by order of value: foodstuffs, cotton piece goods, machinery, oils, wood, hardware, iron and steel manufactures, leather goods Leading exports were, in order: gold, wool, diamonds, hides and skins, corn, mohair, coal. Proportions of the merchandise import trade by countries of origin, for 1910 and 1922, were: Great Britain, 70 and 53 5 per cent; United States, 8 and 11.8 per cent In 1920, American imports were 18.2 per cent and in 1921, 15.6. In 1922, German imports were 6.1 per cent (9 per cent in 1913). Proportions of export trade by countries of destination, for 1910 and 1922, were: Great Britain, 81 and 78.2 per cent; United States, 17 and 3.9 per cent Exports to Germany for 1922 were 4 7 per cent. Imports into the Union during the first six months of 1923 totaled £25,343,417; exports were £36,398,591, an increase of £11,000,000 over the first half of 1922. Principal imports from the United States were oils, automobiles, cotton piece goods, hardware and cutlery, lumber and agricultural and mining machinery The leading ports were Cape Town, Durban, Port Elizabeth, and East London. In 1912, 4106 vessels of 12,205,300 tons entered, and 4080 vessels of 12,163,081 tons cleared the ports. In 1921, these were entered, 3567 vessels of 10,210,000 tons, cleared, 3532 of 10,217,000 tons A drydock at Durban, said to be the largest south of the equator, was begun in 1919. Its length was 1150 feet.

Transportation. In May, 1910, the provincial railways were amalgamated into a single system denominated the South African Railways under the control of the Union. To this were added the railways of Southwest Africa in April, 1922. On Dec. 31, 1913, the total government mileage was 8282; in March, 1923, this was 10,987 miles (Cape—4254 miles, Orange Free State—1342 miles, Transvaal—2644 miles, Natal—1415 miles, Southwest Africa—1331 miles) New lines built were from Prieska to Kalkfontein, for military purposes; Krugersdorp to Mafeking; the completion in the Cape Province of the Mossel-George-Oudtshoorn line connecting Cape Town and Port Elizabeth. In 1923 projects were under way for the addition of 853 miles, and for electrification of 250 miles of track, principally between the Natal coal fields

and Maritzburg. The first section of the electrical railway was opened in May, 1924. In 1913, earnings of the railways were £13,214,000; in 1922–23 they were £20,146,797. The operating ratio, i.e. expenditures over earnings, was 77 per cent in 1922–23 as compared with 54 per cent in 1910. The railways were running behind, as was evinced by the fact that the end of the fiscal year 1922–23 saw an accumulated deficit of £2,220,511.

Finance. Revenues and expenditures for 1911–12 were £17,369,030 and £13,234,505 and for 1922–23 (estimates) £28,695,000 and £24,827,940. To the last figure must be added £10,763,000 charged to the loan account. These figures excluded the railway and harbor accounts which were managed separately. Chief sources of revenue were income, super excess profits, and dividend taxes, customs and excise, interest, posts, telegraphs and telephones. Native taxes were hut and poll taxes. The public debt in 1912 was £117,260,534; in 1922, £191,784,936. Expenditures for war purposes raised by loans during 1915–22 totaled £23,173,985 After 1913 the provinces were made to depend for their finances upon assigned revenues made to them by the Union together with annual subsidies limited to 50 per cent of their normal expenditures. Expenditures were primarily for education. For 1913–14 and 1920–21, the subsidies to the provinces were as follows: Cape, £862,000 and £1,701,000; Natal, £361,000 and £621,999; Transvaal, £629,000 and £1,539,000; Orange Free State, £341,000 and £615,999. In June, 1921, a central Reserve Bank was established at Pretoria with branches at Cape Town and other important centres. The subscribed capital was £1,000,000 and on Oct. 31, 1923, the Bank had issued £10,644,613 in notes. On June 30, 1922, the note issuing powers of the Joint Stock Banks had come to an end. In addition to its functions as a bank of issue, and the principal holder of the gold reserves of the country, the Reserve Bank operated as a bank of discount. The rate of exchange of the pound fluctuated as follows over the period discussed: average, 1914, $5.14; 1920, $3.66; 1922, $4.43; 1923, $4.57. Wholesale prices were (1910 = 100): 1914, 109; 1919, 185.4; 1920, 251.2; 1922, 144.5; October, 1923, 125.3 Retail (cost of living) prices (1914 = 100): 1921, 162; 1922, 135, October, 1923, 132.

History. The generation of Boers who had fought against Great Britain in 1902 was alive when the War broke out in Europe. Many of the Boers still entertained nationalistic aspirations and saw in the War an opportunity to gain release from the domination of the British Empire. However, the more important Boer leaders like Botha and Smuts were true to the British purpose and by the weight of their example gained the Union for the Allies and gave material assistance in subjugating the German African colonies The Dutch nationalistic cause was, nevertheless, real, and in 1914 assumed serious proportions. The immediate reason for the disaffection was the decision of the government to send a force against German Southwest Africa. In October, 1914, a serious rebellion was launched by Boer irreconcilables most of whom sought to further their own aims rather than the purposes of Germany. The leaders were General de Wet and General Beyers, while the man to whom all looked for inspiration was General De La Rey. Unfortunately for the rebels, General De La Rey was shot and killed by a police patrol on Sept. 15, 1914, while on his way to join the insurgent camp. The rebellion broke out actively, however, under de Wet and Beyers, and General Botha was obliged to take the field against his erstwhile companions in arms. After some desultory fighting the Boers were dispersed and de Wet surrendered (Dec. 1, 1914) while Beyers was drowned in the Vaal river while trying to evade capture (Dec. 9, 1914). The losses were not heavy although the forces engaged were considerable. In all 10,000 rebels had taken up arms. Only one of the leaders, Fourie, was sentenced to death for his part in the insurrection. Clemency was shown to the others in the way of light prison sentences, so that by December, 1915, de Wet was free. With active opposition gone the move on German Southwest Africa went through successfully, with the result that by July, 1915, the colony was subjugated. Considerable aid was also rendered by Briton and Boer alike in the European and East African campaigns, 150,000 South Africans seeing service. Throughout the war period the Dutch nationalists, led by General Hertzog, continued in opposition and a coalition of the South African party (Botha-Smuts) and the Unionists was necessary to carry on the government. Republican propaganda became more and more virulent and by 1917 the Nationalists were outspoken in favor of a republic. They appealed to President Wilson to intercede; in fact General Hertzog made a trip to Paris via New York to lay the matter before the President, but without success. At Versailles, Botha and Smuts signed the treaty for the Union. Botha having died in 1919, Smuts became prime minister. The election of 1920 indicated that the Nationalists had gained ground rather than lost. The poll showed: Nationalists, 45; South Africans, 40; Unionists, 25; Labor, 21. The only hope for a strong government was a permanent alliance between the two pro-British parties, and this Smuts was able to effect after many pourparlers in 1920. The election of 1921 could therefore be held on the frank issue of republicanism. The result gave Smuts a clear majority, the poll showing returned 76 of the enlarged South African party, 47 Nationalists, 10 Labor. In 1922, the Nationalists and Laborites came to an understanding by which the urban districts were to be contested exclusively by Labor candidates and the rural districts by Nationalists, the condition being, however, that the Republican agitation was to cease for the life of the existing parliament. However, the Nationalists openly set forth their secessionist principles the following year with the result that two of the most important Labor leaders, Colonel Creswell and Mr. Barlow, were estranged. Inherently weak as the Labor-Nationalist alliance was, it harried the government during three uneasy years, reduced the government's parliamentary majority, little by little, until it was finally only four, and eventually provoked General Smuts to dissolve the Union Parliament on Apr. 7, 1924 and appeal to the electorate in a general election. From 1921 on the government had been steadily losing ground, for a variety of reasons. The Nationalists still smarted under the defeat of 1914; the Laborites resented the severity with which strikes had been suppressed; there was general complaint over the fact that Smuts had

consistently neglected dominion affairs because of his international interests. The result was, in the elections of June, 1924, a decisive defeat for the government party and the return of the Labor-Nationalist alliance. Even Smuts himself lost his seat. General Smuts resigned on June 23 and was succeeded by a Labor-Nationalist coalition headed by General Hertzog. Colonel Creswell, leader of the Laborites, joined the cabinet with the portfolio of Minister of Defense and Labor. Particularly significant was the pact of April 21 between the two government groups which was to serve as the basis of the coalition. By it, the Nationalists promised to relinquish their secessionist agitation for five years while the Laborites, for the same period, pledged themselves to refrain from socialist propaganda.

The vexatious problem of the status of immigrants from India was very acute on the eve of the War, but was allowed to rest during the world conflict, partly for the sake of patriotic solidarity, and partly because of the agreement which had been reached in 1914 between General Smuts and Mohandas K. G. Ghandi (whose leadership of the passive resistance movement among the Indians of South Africa before the War served as training for his subsequent and more prominent career in India). By this agreement, the government promised that the existing laws relative to the rights of Indians in the Union would be enforced in a just manner and with due regard to vested rights; this was generally understood to mean that the rights of Indian residents would not be further curtailed by legislation or by administrative interpretation of the laws. During the war period, however, this interpretation was challenged. In the Transvaal, where by a state law Indians were forbidden to purchase land, as individuals, the Indian merchants evaded this restriction by forming joint stock companies to acquire real estate. The frequency of their purchases alarmed the white community, who insisted on the prohibition of this practice by new legislation, and accordingly an act of the Union Parliament in 1919 forbade corporations of Asiatics to acquire realty. Once more race hatred burst into flames. Curiously enough, the most frenzied agitation against the "Asiatic peril" was not in Natal, where about four-fifths of the 150,000 Indians in the Union were concentrated, outnumbering the whites, but in Transvaal, where the number was relatively small. The explanation of the seeming paradox is that in Natal the greater number of the Indians were coolie laborers on sugar and tea plantations, whereas in Transvaal the Indians were merchants and traders, often prosperous and aggressive businessmen whose competition was feared, perhaps in an exaggerated degree. The Union government in 1920 appointed an Asiatic Inquiry Commission to go into the whole matter. The Commission's report, dated March, 1921, sustained the 1919 law and recommended that in Natal Asiatic landownership for agricultural purposes should be confined to the coastal zone, while elsewhere a policy of voluntary segregation should be pursued. This expression of anti-Indian sentiment, though couched in the most restrained terms, was sufficiently pointed to evoke a protest from the Government of India, which, by the way, was at this time manifesting grave concern regarding the rights of Indians in Kenya Colony (see KENYA). When, in the summer of 1921, the problem was aired in the British Imperial Conference at London, the determined efforts of the Indian government to secure the adoption of a general principle of equal rights for natives of India were met by an even more determined, and successful, opposition by the South African delegates, General Smuts and Sir Thomas Smartt. There the matter rested. In 1924, a fresh outburst of racial antipathy was caused by agitation for and against a Class Areas Bill, which proposed to impose drastic restrictions, amounting almost to prohibition, on the holding of property, leases, and trading licenses by Asiatics, outside of designated areas.

Internal problems that provoked the most attention during the period 1914–24 were the status of the natives and the growing articulateness of labor. The pressing demand for citizenship and equality of treatment of the native Bantus, many of whom were in the professions and had been under the tutelage of native aggressive churches, was a point of serious consequence. Around the question of segregation of natives in restricted areas, the whole contention crystallized. The Nationalists and South Africans favored the proposal, the Unionists were opposed. In 1920, a segregation act was passed, applicable to the rural districts It stood frankly for the policy of white supremacy over the blacks and though it granted the natives some autonomy, it held out no hope for the possible fusion, politically, of the two races. In 1923, an act was passed allowing natives to settle in urban districts. During the War period, native outbreaks were frequent. Strikes occurred on the Rand and elsewhere during 1917–20, and blood was spilled at Port Elizabeth in 1920. On May 24, 1921, at Bulhoek, a body of natives calling themselves Israelites, on refusing to disperse and leave for their homes, were fired upon and 400 casualties were the result. Labor unrest, due to the closing of the diamond mines after the depression of 1921, was equally acute. In 1922, a strike in the gold, coal, and diamond mines took on serious proportions and led to open warfare A general strike was called on one hand, and martial law was declared on the other; Fordsburg, one of the strongholds of the strikers, was shelled and finally taken. Though hostilities were brief, the losses on both sides were 183 killed and 524 wounded. Financial losses were placed at $25,000,000. The miners contended that the owners were attempting to introduce wholesale native labor and cut wages radically; the owners and the government charged the outbreaks to the extremists who had communistic leanings.

The governor general of South Africa for 1914–20 was Lord Buxton; he was succeeded by Prince Arthur of Connaught.

SOUTH AMERICA, EARLY CIVILIZATION OF. See ETHNOGRAPHY.

SOUTH AUSTRALIA. A state of the Australian Commonwealth occupying the central and southern part of the continent. Area, 380,070 square miles; population (excluding aborigines) in 1911, 408,558; in 1922, 505,069; average annual increase, 2.45 per cent. Adelaide, the largest city, including suburbs, had 260,542 inhabitants in 1921 (200,117 in 1913). The area under cultivation continued to increase, wheat in particular showing gains. From 16,938,988 bushels of wheat in 1913–14, production mounted to 34,258,914 bushels in 1920–21. Other crops

were barley, oats, hay, and vines. Pastoral activities continued to occupy a prominent rôle. Mineral production in 1921 amounted to £944,052 (£634,318 in 1913); copper, the most important, was valued at £106,370 in 1921. Value of production for 1920–21: agricultural, £19,981,471; pastoral, £5,624,217; manufacturing, £7,837,340; mining, £1,154,742; dairying, £3,498,101; total, £39,054,203. Imports and exports for 1913 were £7,348,340 and £9,809,763; for 1921–22, £9,047,242 and £14,761,915. Government accounts showed: revenues and expenditures for 1913–14, £4,822,766 and £4,604,129; for 1921–22, £7,771,752 and £7,826,241. The public debt, from £33,564,332 in 1914 mounted to £62,496,585 in 1923.

SOUTH CAROLINA. South Carolina is the thirty-ninth State in size (30,989 square miles), and the twenty-sixth in population; capital, Columbia. The population increased from 1,515,400 in 1910 to 1,683,724 in 1920, a gain of 11 1 per cent. The white population increased from 679,161 to 818,538; the Negro (which, it will be noted, considerably surpasses the white), from 835,843 to 864,719; native white, from 673,107 to 812,137; foreign-born white, from 6054 to 6401. Both urban and rural populations rose during the decade; the former from 224,832 to 293,987, the latter from 1,290,568 to 1,389,737. The growth of the principal cities was as follows: Charleston, 58,833 in 1910 to 67,957 in 1920; Columbia, 26,319 to 37,524; Greenville, 15,741 to 23,127.

Agriculture. As South Carolina is one of the most important cotton-producing States, agricultural conditions in the decade 1910–20 reflected, as in the case of other cotton-producing States, the ravages of the boll weevil which reached the State in 1918 or 1919. This is indicated by a comparison of the acreage and production of cotton for the various years: 1913, acreage 2,790,000, production 1,378,000 bales; 1915, acreage 2,516,000, 1,134,000 bales; 1917, 2,837,000 and 1,237,000 bales; 1920, 2,964,000 and 1,623,000 bales. The acreage in 1922 was 2,058,000; and the production fell to 530,000 bales. The estimated production of 1923 was 783,000 bales For a discussion of conditions resulting from the ravages of the boll weevil, and of general conditions relating to cotton-growing in the decade, see BOLL WEEVIL and COTTON. While the population of the State increased 11.1 per cent in the decade, the number of farms increased 9.2 per cent (from 176,434 in 1910 to 192,693 in 1920). The total acreage in farms decreased from 13,512,028 to 12,426,675, or 8 per cent; but the improved land in farms increased from 6,097,999 to 6,184,159 acres. While the percentage of total land area used for agricultural purposes decreased from 69.2 to 63.7, the percentage of land improved increased from 45.1 to 49.8 per cent. The total value of farm property showed an apparent increase, from $392,128,314 in 1910 to $953,064,742 in 1920, or 143 per cent; the average value per farm, from $2223 to $4946, or 122.5 per cent. In interpreting these values and all comparative values in the decade 1914–24, the inflation of currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 192,693 farms in 1920, 67,724 were operated by owners, 738 by managers, and 124,231 by tenants. The comparative figures for 1910 were 64,350,863, and 11,221. White farmers in 1920 numbered 83,683, of whom 83,542 were native; the Negro farmers numbered 109,005. White farmers in 1910 numbered 79,636 and the Negro farmers 96,772. Farms free from mortgage in 1920 numbered 42,847, compared with 47,535 in 1910; those under mortgage 14,299, compared with 15,020. Dairy cows in 1920 numbered 228,569; 180,842 in 1910. The number of hogs also increased from 665,211 to 844,981. "Beef cows" decreased to 64,949, from 65,319; sheep from 27,926 to 23,581. The estimated production of the principal farm crops in 1923 was as follows: corn, 32,432,000 bushels; wheat, 1,925,000 bushels; oats, 10,192,000 bushels; potatoes, 2,882,000 bushels; sweet potatoes, 9,050,000 bushels; tobacco, 66,730,000 pounds; hay, 362,000 tons; peanuts, 32,832,000 bushels. Comparative figures, for 1913, are: corn, 38,512,000 bushels; wheat, 972,000; oats, 8,460,000; potatoes, 800,000; hay, 244,000 tons; and tobacco, 33,288,000 pounds.

Manufactures. The industrial development of South Carolina has been slow but steady. The chief increase in recent years was in the various phases of cotton manufacturing. In 1920, there were, in the State, six cities with more than 10,000 inhabitants, having 10.3 per cent of the total population of the State. These cities, in 1919, reported 21.3 per cent of the value of the State's manufactured products. There were in the State, 1854 manufacturing establishments in 1909; 1885 in 1914; and 2004 in 1919. Persons engaged in manufacture numbered 78,040, 77,603, and 86,360; and the capital invested amounted to $173,220,870, $203,210,875, and $374,537,636 in those years The value of the products in 1909 was $113,235,945; in 1914, $138,891,202; and in 1919, $381,452,984. The abnormal increase in value of products being to a great extent due to the change in industrial conditions produced by the War, statistics of this item cannot be used as an exact measurement of the growth of manufactures between the industrial censuses of 1914 to 1919, but a comparison of the number of establishments and persons engaged in those years, shows a considerable increase in the manufacturing activities of the State. The first industry in point of value of product is the manufacture of cotton goods, valued in 1909 at $65,930,000; in 1914, at $78,446,000; and in 1919, at $228,440,000 The manufacture of cotton-seed oil and cake is second in this respect, with a product valued in 1909 at $10,903,000; in 1914, $16,380,000; and in 1919, $38,675,000. Fertilizers, ranking third, in 1909 were valued at $9,025,000; in 1914, $13,824,000; and in 1919, $30,412,000. The production of mineral and soda waters was next in order: in 1909, $740,000; in 1914, $1,541,000; and in 1919, $5,351,000. The chief manufacturing cities of the State are Charleston and Columbia.

Education. South Carolina has undoubtedly a more difficult educational problem than most of the other States, due to the extremely large Negro population and to the large rural population. In spite of these difficulties, great progress was made in the decade 1913–23. This is indicated by the fact that while South Carolina still has the largest percentage of illiteracy of any of the States, it also showed the largest decrease in the decade 1910–20. The Legislature, during the period, passed many important

laws designed to improve educational conditions. Among these were the compulsory educational law passed in 1918 and revised in 1920, which proved a great stimulus and incentive to school attendance and added thousands of pupils to the enrollment list. The general assembly of 1922 made unusually liberal appropriations for public education. The State has an excellent rural graded-school Act, supplemented by an equalizing Act guaranteeing the seven-months term. Great progress was made in vocational education, especially in agriculture, textiles, home economics, and training of teachers. Coöperation is given by Clemson College, Winthrop College and the State Colored College. The total enrollment in town schools for whites in 1922 was 115,769; in country schools for whites, 120,844; in Negro town schools were enrolled 64,379; and in Negro country schools 161,888, making a total white enrollment of 236,613 and a Negro enrollment of 226,267, or a total enrollment in the State of 462,880. In 1913, the total enrollment was 361,161; 167,914 white, 193,247 colored. The enrollment in the high schools in 1922 was 113,461 Expenditures for schools in 1922 was $9,517,968. The percentage of illiteracy in the State decreased from 29.6 per cent in 1910 to 23 per cent in 1920 Among the native whites it decreased from 11.4 to 8.5 per cent; among the colored population, from 46.9 to 38.7. Among the foreign-born whites, it remained for both periods 6.5.

Finance. For finance, see STATE FINANCES.

Political and Other Events. South Carolina, consistently Democratic since the Civil War, remained so in the decade 1914–24. Elections were held in 1914 for governor, State officers, representatives to Congress and U. S. senator. Ellison D. Smith was a candidate for reelection to the Senate and was opposed for the nomination by Governor Cole I. Blease Senator Smith was elected and Richard I. Manning was elected governor. Governor Blease, whose term was a sensational one, brought it to a close by wholesale pardon of State prisoners. At the expiration of his term he had freed more than 3000 prisoners as a protest against the prison laws of the State. In January, 1915, prior to his leaving office, he disbanded the organized militia of the State, as a result of a difference with the Federal War Department over its administration. Mr. Manning took the office of governor on January 11. He at once revised the order disbanding the militia. Statewide prohibition was adopted by a majority of the people, to go into effect Jan. 1, 1916. Governor Manning was reëlected in 1916, defeating former Governor Blease for the nomination. It was necessary to hold two primaries, as under the South Carolina primary system, a nominee must receive a majority of all the votes cast, otherwise a second primary must follow. In the first primary, Blease led by more than 20,000 votes but lacked 500 of the majority. In the second primary, however, Governor Manning received the majority of the votes and later was elected. In the presidential voting of that year, President Wilson received 61,846 votes and Charles E. Hughes, 1550. As a result of the death of Senator Tillman, in 1918, Christie Benet was appointed by the Governor to fill out the unexpired term. In November, N. B. Dial was elected as successor. R. E. Cooper was elected governor. On May 20, 1922, he was appointed a member of the Federal Farm Loan Board, and was succeeded by Lieutenant-Governor Wilson G. Harvey. In 1922, Thomas G. McLeod defeated Governor Blease in the Democratic nomination for governor and was elected. He was inaugurated in January, 1923. In his inaugural address he favored efficiency and economy in the government and the enforcement of the prohibition law.

Legislation. The most important acts of the Legislature in the decade 1914–24 are indicated below. In 1915, several important measures relating to the regulation of the liquor traffic were enacted. The Legislature in 1916 passed a measure creating a State system of rural credits. Liquor laws were amended, as were the laws relating to insurance and public utilities. The Legislature of 1919 put further restrictions on child labor. It also passed a law requiring compulsory school attendance of children under 14. The Legislature of 1921 provided for a State Board of Fisheries and passed an act regulating the storage, grading and marketing of cotton and other nonperishable farm products. It also amended the laws of 1912 relating to exemption from jury duty, by including female electors in the exempt class. The Legislature of 1923 passed a measure under which cities with populations between 20,000 and 50,000 are permitted to adopt the manager plan of city government. A bill prohibiting the public wearing of masks was defeated.

SOUTH CAROLINA, UNIVERSITY OF. A nonsectarian coeducational State institution at Columbia, S. C., founded in 1801. The enrollment of students increased from 540 in 1915 to 909, of whom 192 were women, for the scholastic year 1923–24. The faculty consisted of 50 professors and 27 instructors and assistants. New dormitories for men and a new dormitory for women were completed during the year 1923–24, besides other improvements and additions. There were approximately 90,000 volumes in the main library in 1924 and about 12,000 in the library of the School of Law of the university. Wm. Davis Melton, LL.D., succeeded Wm. S. Currell, LL.D, as president in 1922

SOUTH DAKOTA. South Dakota is the fourteenth State in size (77,615 square miles), and the thirty-seventh in population; capital, Pierre. The population increased from 583,888 in 1910 to 636,547 in 1920, a gain of about 9 per cent. The white population increased from 563,771 (1910) to 619,147 (1920); and the native white, from 463,143 to 536,756. The Indian population decreased from 19,137 to 16,384 and the foreign-born white from 100,628 to 82,391. The urban population rose from 76,673 to 101,872, and the rural from 507,215 to 534,675. There are only two important cities in the State, Sioux Falls and Aberdeen. The former increased from 14,094 in 1910 to 25,202 in 1920, and the latter, from 10,753 to 14,537.

Agriculture. As South Dakota is almost entirely an agricultural State, it was greatly affected by conditions which prevailed during and after the War. From 1917 to 1920 there was a period of prosperity due to the world-wide demand for wheat and other grains which are the chief agricultural products of the State. This period was succeeded by one of depression caused apparently by financial conditions, but more especially by overproduction of wheat, which resulted in a lowering of the price to an extent which made it unprofitable to farmers. These conditions prevailed in 1921–23. While the

population of the State increased 9 per cent in the decade 1910–20, the number of farms decreased 3.9 per cent (from 77,644 to 74,637). The acreage, however, increased from 26,016,892 to 34,636,491, or 33.1 per cent; and the improved land in farms increased 15 per cent, or from 15,827,208 to 18,199,250 acres. The percentage of the total land in farms rose from 52.9 per cent in 1910 to 70.4 per cent in 1920, but the percentage of improved land in farms decreased from 60.8 per cent to 52.5. The total value of farm property increased 142.2 per cent in the decade, or from $1,166,096,980 to $2,823,870,212; the average value of farm property from $15,018 to $37,835. It must be borne in mind, however, that these values do not represent the actual increase; there must be taken into consideration the decreased purchasing power of money and other economic and financial conditions following the War. Of the total of 74,637 farmers in 1920, 47,815 owned their own farms, 781 were managers and 26,041 were tenants. In 1910, the owners numbered 57,984, the managers 431 and the tenants 19,231. It will be noted that there was a considerable decrease in the number of owners in the decade, while the number of both managers and tenants showed an increase. The white farmers in the State in 1920 numbered 73,025, compared with 74,836 in 1910; in 1920, there were 16,037 farms free from mortgage, and 27,262 mortgaged; in 1910, 35,101 farms were free and 21,691 mortgaged. The acreage, production and value of the principal crops, in 1923, was as shown in the table.

Crop	1923 Acres	1923 Bushels	1923 Value	1913 Acres	1913 Bushels	1913 Value
Corn	4,208,000	145,176,000	$75,492,000	2,640,000	67,320,000	$37,699,000
Spring wheat	2,735,000	25,982,000	21,045,000	3,775,000 [b]	33,975,000	24,122,000
Winter wheat	77,000	924,000	748,000			
Barley	890,000	20,025,000	8,010,000	958,000	16,765,000	7,712,000
Flaxseed	284,000	2,414,000	5,021,000			
Oats	2,304,000	78,336,000	24,284,000	1,590,000	42,135,000	14,326,000
Rye	304,000	3,496,000	1,713,000	50,000	660,000	330,000
Potatoes	88,000	7,744,000	3,872,000	60,000	4,680,000	2,948,000
Hay	1,050,000	1,732,000 [a]	14,029,000	460,000	552,000 [a]	3,588,000

[a] Tons instead of bushels.
[b] Given as wheat only, not differentiated into spring and winter.

Manufactures. See UNITED STATES, *Manufactures.*

Education. Educational progress in South Dakota in the decade 1913–23 was steady and consistent. Not only was the number of teachers increased at a more rapid rate than in many States, but large sums were spent in a State-wide building programme for fine rural and city schools. Teaching requirements were considerably raised and general teaching conditions vastly improved. Among the specific accomplishments was the establishment of a high-school division with a director in charge. In 1919, there were only 112 accredited high schools in the State; in 1923 there were 249, with much more rigid requirements. Another feature was the establishment of Americanization work. The total enrollment in the evening schools after the introduction of that work exceeded 3000. Home economics and agricultural courses were established in high schools under the Smith-Hughes Act, and the rehabilitation of disabled civilians was also undertaken. A "Better School Drive" in 1919 produced excellent results, including the erection of dozens of fine consolidated schools and hundreds of modern one-teacher schools. The Legislature passed a law providing State aid to consolidated standard and rural schools, and State inspection of rural and consolidated schools was also established. A new compulsory attendance law was enacted, and legislation provided for State supervision of its enforcement, as a result of which the average attendance per rural pupil enrolled increased from 102 to 127 days per year. The law provides for at least an eight-month term in every school in the State. The total enrollment below the grade of high school in 1912 was 90,389; in 1921 it was 133,343. In the high schools, in 1921, there were 16,584 pupils enrolled. Total expenditures for schools in the latter year were $15,054,924. The percentage of illiteracy in the State decreased from 3.7 in 1910 to 2.2 in 1920; in the native white population it remained at 0.4 per cent. among the foreign-born white it decreased from 5 per cent to 4.9; among the colored, from 6.8 to 6.7.

Finance. For finance, see STATE FINANCES

Political and Other Events. Political events in South Dakota in the decade 1914–24 were marked in the latter part of the period by the influence of the Non-Partisan League, which gained considerable strength in the State, although lacking the power which marked its growth in North Dakota. The Republicans in 1914 reelected Governor Byrne, but Senator Crawford was defeated for reëlection by E. S. Johnson, Democrat. The Republicans elected representatives in all three districts of the State. In 1916, Peter Norbeck, Republican candidate, was elected governor. At this election a constitutional amendment prohibiting liquor traffic and a woman suffrage amendment were defeated. The State celebrated the anniversary of its settlement in July, 1916. In the presidential voting of this year, Charles E. Hughes received 64,261 votes; President Wilson, 59,191 Governor Norbeck was reëlected in 1918. In this year the so-called Non-Partisan League acquired great political strength and cast over 25,000 votes for a candidate for governor. Thomas Sterling, Republican, was elected to the Senate. In the elections of 1920, the Republican candidate for governor, W. H. McMaster, was elected, and Peter Norbeck, former governor, was elected to the Senate. In the presidential voting of this year, Warren G. Harding received 109,874 votes; James M. Cox, 35,938. T. P. Christiansen, the Farmer-Labor and Non-Partisan candidate for the presidency, received over 34,000 votes. Governor McMaster was reëlected in 1922, together with the entire State ticket and three members of Congress. The State was seriously affected during this year by a bituminous coal strike and by a strike of railroad shopmen, which continued from July 1 until the autumn. As a result, elevators and granaries were for a long period congested with crops, while the impossibility of

moving the crops broke down the market to such an extent that much of the produce was sold at a loss. Various amendments proposed were defeated in 1922. Governor McMaster was inaugurated on Jan. 2, 1923. In his inaugural address he dealt chiefly with the agricultural problems of the State. Presidential primary elections were held in April, 1924. Hiram Johnson was endorsed as the Republican candidate. Senator Sterling was defeated for reëlection to the Senate by Governor McMaster.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. The Legislature of 1915 passed a bill abolishing the death penalty. The Supreme Court of the State in this year declared the so-called "blue sky" law of the State unconstitutional. In 1917 a budget system was created. A new primary law was enacted, and a prohibition law was passed, to become effective in February, 1918. The Legislature also passed a workmen's compensation law and amended the banking laws of the State. A special commission was appointed to make a survey of the educational system. The Legislature of 1919 passed measures forbidding the display of the red flag calculated to excite hostility or violence to the government. It also passed a measure providing for a land settlement commission to encourage and to assist former soldiers and sailors to build homes and to own farms. Provision was made in 1921 for the loan of money for urban home building under the Rural Credits Board. The primary law was simplified and bills were initiated for the establishment of a State bank and for the development of hydroelectric power Amendments providing for the two latter were defeated in the election of 1922. The Legislature of 1923 passed a measure prohibiting expenditures in excess of appropriations. It also made provision for a constitutional convention, passed a uniform flag act, and enacted a measure to facilitate the cooperative marketing of agricultural products. Provision was made for the creating of associations for this purpose.

SOUTH DAKOTA, UNIVERSITY OF. A coeducational State institution at Vermillion, S Dak, founded in 1882. During the decade 1914–24, the university increased 200 per cent in the number of students, added 200 courses to its curriculum, and completed three buildings. The student enrollment in 1913–14 was 421 as compared with 1239 in 1922–23, the faculty numbered 50 members as compared with 90, and the library contained 20,500 volumes as compared with 45,000 volumes The women's building, engineering shops and observatory, and the chemistry building were completed, and the stadium and administration building were begun. Departments in journalism and commerce were opened in 1915. Robert L. Slagle, Ph D., LL.D., succeeded Franklin P. Gault, Ph.D., as president in February, 1914.

SOUTHERN CALIFORNIA, UNIVERSITY OF. A coeducational institution at Los Angeles, Cal., founded in 1879. The student enrollment increased from 2649 in 1913–14 to 7846 in 1922–23 and 6862 in the first semester of 1923–24. The teaching staff increased correspondingly from 207 to 403 members and the library from 21,000 to 55,000 volumes. The productive funds rose from $412,548 to $2,614,792, and the total yearly income from $106,766 to $860,000. The School of Commerce and Business Administration was organized in 1920, and in the first three years of its existence increased more than 200 per cent in enrollment; an extension division was organized in 1922, and in 1923, the School of Social Welfare under the direction of Dr. Emory S. Bogardus. One building of the science unit, for the College of Pharmacy and the department of chemistry, was expected to be begun in 1924, and the cornerstone of the first unit of the women's building was to be laid. This first unit was to be a residence hall; the other buildings were to be a women's gymnasium and a home economics building. President, Rufus B. von Kleinsmid, A.M., Sc.D., J.D., D M.C.P., Ph. et Litt.D.

SOUTH POLE. See POLAR RESEARCH.

SOUTHWEST AFRICA PROTECTORATE. Formerly German Southwest Africa (q.v.) but since 1920 a mandate territory of the British Empire administered by the Union of South Africa. It has an area of 322,400 square miles, and an estimated native population of 208,307. The European population, according to the 1921 census, was 19,432 of which 7855 were Germans and the remainder South Africans. The capital, Windhoek, had 3460 Europeans and 4399 natives. Only the German soldiers (about 6000) were repatriated, the civilians being permitted the possession of their holdings. Many of the British soldiers settled on the land and took up stock raising and farming, with the result that the British population was soon considerable. The Germans, however, after the conclusion of the War, maintained their efforts to gain autonomy and remained hostile to the British-Dutch penetration which not only extended to administration but to currency, schools and the like. The Germans continued to support their own schools in disregard of the tenders of the government. Diamond mining, exploited by British capital, continued the most important activity and was the largest factor in the protectorate's foreign trade. In 1922, £343,930 in diamonds were exported to the United Kingdom. Other exports were live stock, copper ore, vanadium, lead and tin. In 1913, exports were valued at £3,446,220; in 1919, £1,679,534; in 1920, £5,401,385 (of which £4,265,294 were diamonds); in 1922, £1,247,229. Countries of destination of 1922 exports by proportions were: United Kingdom, 28 per cent, South Africa, 34 per cent; Belgium, 26 per cent; Germany, 6 per cent; United States, 1.2 per cent. Leading imports in 1922 were foodstuffs, apparel, cotton goods, mineral oils, etc. Under the Germans, in 1913, imports were valued at £2,171,230; in 1919, £1,135,116; in 1920, £2,180,183; in 1922, £1,147,637. Countries participating were: Union of South Africa, domestic produce, 32 per cent; foreign produce, Union of South Africa, 32.6 per cent; Germany, 18.6 per cent; United Kingdom, 2.8 per cent; United States, 2 per cent. In 1922, there were 968 miles of railway of 3-foot 6-inch gauge and 475 miles of 2-foot gauge. The most important port, Walvis Bay, was opened up when the British built a 22-mile line from Walvis Bay to Swakopmund, the western terminus of the territory's most important railway. The Union of South Africa was linked to the protectorate when a line was built for military purposes from Prieska to Kalkfontein. In 1922, a line of 132 miles was in the course of construction from Windhoek to Gobabis.

In October, 1915, after the military forces

had occupied the country, a civil administration was established, though martial law was maintained until 1921. Germany, in the Treaty of Versailles, renounced her sovereignty, with the result that Southwest Africa was assigned to the Union of South Africa as a mandate territory in May, 1919. The mandate was approved by the League of Nations Council on Dec. 17, 1920. The governor general delegated his powers to a local administrator who was to be assisted by a nominated council of nine made up of four Germans, four South Africans, and one official. For the fiscal year 1922–23, revenues amounted to £870,930 (in 1917–18 they were £650,000). The principal source of revenue was the tax on diamonds, while £75,000 was paid annually as revenue from customs by the Union Customs Department. The laws of the Union were gradually being introduced into the country.

SOVIET REPUBLICS, UNION OF SOCIALIST. See RUSSIA.

SOVIETS, ALL-RUSSIAN CONGRESS OF. See COMMUNISM.

SOWERBY, LEO (1895–). An American composer, born at Grand Rapids, Mich. He received his entire musical education in Chicago, studying with C. F. Lampert, P. Grainger (piano), E. Delamarter (organ) and A. O. Anderson (composition). In 1918–21, he taught theory at the American Conservatory there, and was also organist at the South Congregational Church and critic for the *Inter-Ocean* In 1921, he was awarded a special fellowship by the American Academy in Rome, where he spent the following two years. He appeared as soloist in his own works. As a composer he is a decided futurist, although he himself claims affinity with the neoclassicists (Franck-d'Indy). His works comprise: a symphony; a symphonic sketch, *The Sorrow of Mydath;* an overture, *Comes Autumn Time; Suite in the Old Style; Rhapsody on British Folk-Tunes; The Ballad of King Estmere* for two pianos and orchestra; a violin concerto, a cello concerto and a piano concerto; a quintet for wind instruments; besides other chamber music, piano pieces, and choruses.

SPA CONFERENCE. See PEACE CONFERENCE AND TREATIES; REPARATIONS.

SPAETH, (JOHN) DUNCAN ERNEST (1868–). An American philologist. He was born in Philadelphia, Pa., and studied at the University of Pennsylvania and at Leipzig, then in Italy and France. He was professor of English at several colleges and lecturer on the University Extension Course of the New York Board of Public Education. After 1911, he was professor at Princeton. He is the author of *Christian Theology in Browning's Poetry* (1916) and *Old English Poetry* (1921); and editor, with Henry S. Pancoast, of *Early English Poetry* (1921). During the War, he was educational director of Camp Wheeler and Camp Jackson and edited a *Camp Reader for American Soldiers,* adopted by the War Department for the American Expeditionary Forces.

SPAIN. A constitutional monarchy of southwestern Europe. Continental Spain has an area of 190,050 square miles; Greater Spain (including the Balearic and Canary Islands and the Spanish possessions in the north and west coast of Africa) has 194,800 square miles. Population in 1910 was 19,950,817: in 1920, 21,347,335; average annual increase, 0.65 per cent; density of population in 1920, 109.5 per square mile; maximum density in province of Biscay, 490.1 per square mile; minimum density in province of Soria, 38 per square mile. Principal cities with population in 1920, were: Madrid, 751,352; Barcelona, 710,335; Valencia, 243,783; Sevilla, 205,527; Malaga, 150,584; Murcia, 141,175; Saragossa, 141,350. For the period under discussion, vital statistics were as follows (per 1000 inhabitants): marriages, 1914 and 1921, 6.5 and 7.8; births, 30 and 30.5; deaths, 22.2 and 21.5. Emigration, after the War, took on large proportions once more, 101,980 Spaniards quitting the country in 1919; 185,918 in 1920; 92,504 in 1921; 93,591 in 1922; and 123,804 in 1923, as compared with 129,576 in 1914. Their destinations were for the most part the Argentine, Cuba, Brazil, Uruguay, and Mexico. It should be noted, however, that these emigrations were largely seasonal, covering the period of the harvest only, and that most of the emigrants returned immediately after. In 1910, 59.3 per cent of the population was illiterate. Education in the primary grades made slow progress, though institutions for higher education were fairly well attended. On Dec. 31, 1921, there were 27,429 primary schools in Spain. In 1920–21, 215 secondary schools had 52,288 pupils, and the 11 universities in the country with the university section of Canary Islands, 23,508 students. In 1920–21, the total expenditure on education and the fine arts was 143,180,762 pesetas as compared with 62,584,378 in 1914.

Industry. Agriculture continued the mainstay of the country. Areas under cereal crops increased little: wheat, 9,676,879 acres in 1914 and 10,488,800 in 1923; rye, 1,886,206 in 1914 and 1,801,500 in 1923; barley, 3,402,553 and 4,539,600. The acreage under vines remained about the same (3,315,400 in 1923) though production in gallons was 582,801,120 in 1923 to the 432,617,000 in 1913. Similarly, the production of olive oil was 265,422 tons in 1913 and 298,859 metric tons in 1923. Other important products were rice, beans, peas, lentils, tares, vetches, flax, hemp, pulse, esparto, oranges, hazel nuts, onions, almonds. The sugar industry received attention, there being 26 cane sugar factories and 44 beet sugar factories in 1921. Production of cane sugar fell off between 1913 and 1920, for in 1913, 13,231 metric tons of cane sugar were produced as compared with 6760 tons in 1920; in 1921 there was a revival to 12,033 tons. Production of beet sugar was slightly higher than before the War and was increasing; in 1913 there was an exceptionally large production of 148,394 tons, and during the War production slumped, reaching a minimum of 101,258 tons in 1915; after then the increase was steady and gradual, and production reached 159,722 tons in 1921. Pastoral activities were once more on the increase, sheep increasing in number from 14,500,000 in 1913 to 20,522,000 in 1921; goats, 3,394,000 to 4,298,000; horses, 540,000 to 722,000; mules and asses, 1,824,000 to 2,432,900; cattle, 2,878,000 to 3,718,000; hogs, 2,750,000 to 5,152,000. The fishing industry likewise advanced over the period, for 89,000 fishermen were engaged and brought in a catch valued at about 60,000,000 pesetas in 1913, while in 1920 the number of fishermen was 148,700 and the value of the catch, 374,080,000 pesetas. Some 689 factories prepared sardines and fish preserves for the home and export markets. During the War interest in mining was stimu-

lated, but except for coal, soon flagged. All the principal minerals in 1921 showed smaller yields than those of 1912. Iron dropped from 9,139,000 tons to 2,602,000 tons in 1921. Total values of mineral products at the mine mouths were, for typical years: 1910, 453,000,000 pesetas; 1917, 1,323,000,000; 1921, 402,608,000. The number of workers likewise dropped from 149,812 in 1912 to 102,452 in 1921. The War had a heightening influence on the manufactures of the country, which, because of the dearth of capital and Spain's inexperience, was also only temporary. There were 2,614,500 spindles in the cotton establishments in 1910 and only 1,252,900 in 1922; 340,410 spindles in the wool factories in 1922 as compared with 662,000 in 1910. Cork production and paper increased slightly.

Trade. The years 1913 and 1914 saw an excess of imports over exports, but with the beginning of the war period and the heavy demands made on Spain for her products, the balance turned favorable and continued so through 1919. From thence on, imports once more exceeded exports The figures for typical years in thousands of dollars at the prevailing rates of exchange are (excluding treasure):

	1913	1918	1921	1922
Imports	252,067	109,773	382,449	470,143
Exports	204,123	170,626	211,488	224,622

Leading exports were, of course, alimentary substances, including grain, sugar, and wine, metals and their manufactures, wool, timber, and cotton. Imports were machinery, drugs, metals, foodstuffs, etc. The following indicates the distribution of the foreign trade by countries. Imports for 1913 and 1920 (in thousand pesetas): Great Britain, 244,669 and 213,815; France, 204,268 and 219,229; United States, 167,486 and 331,346; Germany, 185,370 and 86,160 Exports for 1913 and 1920: France, 327,744 and 280,078; Great Britain, 231,571 and 218,704; United States, 72,195 and 77,952; Germany, 74,419 and 15,883; Cuba, 64,539 and 81,024 While the figures indicate a healthy state of affairs in the post-war year, it should be remembered that the peseta was worth only 15.9 cents in 1920, and 19.3 cents in 1913, and that wholesale prices in 1920 were more than twice those of the earlier year. The following analysis of Spain's trade with the United States will serve as key to the situation. Figures are in millions of dollars. The index figures are based on the value of the average imports and exports for 1910–14.

	IMPORTS FROM THE UNITED STATES		EXPORTS TO THE UNITED STATES	
	Millions of dollars	Index number	Millions of dollars	Index number
Average 1910–14	26	100	22	100
1920	151	577	42	197
1921	69	264	26	121
1922	71	271	29	133

In 1914, 18,915 vessels of 22,229,159 tons entered and 16,482 of 19,265,265 tons cleared Spanish ports. In 1918, the figures were: entered, 12,475 of 6,745,084 tons; cleared, 13,936 of 7,204,843 tons. In 1921: entered, 19,121 of 20,107,592 tons; cleared, 16,688 of 15,979,977 tons. The Spanish merchant marine consisted of 628 steamers of 844,322 tons and 236 sailing vessels of 32,000 tons in 1914; in 1922, there were 621 steamers of 912,817 tons and 581 sailing vessels of 101,285 tons. There was therefore a substantial increase in spite of the war losses by submarine and mine. Through the middle of 1918, 51 vessels of 123,176 tons were torpedoed and 6 vessels of 16,731 tons were sunk by mines. (These figures exclude boats of less than 250 tons.)

Railways. In 1913, total length of railways open was 9310 miles; in 1920, 9504 miles. The railway service was severely taxed during the War because of the increased traffic caused by the cessation of the coasting trade The continued depreciation of equipment, the higher wages, and only the slight rate increase of 15 per cent allowed, put the railroads in a sorry condition. It was incumbent on the government to increase annually the state subsidies, so that 168,000,000 pesetas had to be paid over during 1922 In 1923, rumors to the effect that the government planned to discontinue the subsidies served to disorganize completely railroad finances. Schemes for the greater use of water power and the electrification of railways were considered during the period. In 1919, the first Spanish subway, that of the Madrid tubes covering a length of 3 miles, was opened.

Finance and Economic Conditions. The revenue in 1914 was 1,343,000,000 pesetas and the expenditure 1,430,000,000. By 1922–23, the revenue had mounted to 2,453,000,000 pesetas (exclusive of loans) and the expenditure to 3,375,090,000. Estimates for 1923–24 were: expenditure, 3,048,386,000 pesetas, and revenue, 2,617,000,000. Deficits thus steadily rose, for the most part because of the refusal of the government to increase the burden of direct taxation. Whereas in 1915, direct taxes were 38.3 per cent of the total revenues and indirect taxes 33 per cent, in 1922–23, direct taxes were 36 per cent and indirect taxes, 40 per cent. For 1921–22, the final deficit was put at 1,101,000,000 pesetas; the deficit of 1922–23 was 922,000,000; and the initial budget estimates of 1923–24 carried a deficit of 431,386,000. In 1922–23 alone, the interest on loans contracted to meet current expenses was 47,000,000 pesetas The national debt over the period showed: External debt, 1915, 1,028,070,000 pesetas; 1923, 910,000,000 pesetas. (This last was merely nominal, however, for about 800,000,000 pesetas of the external debt was held by Spaniards.) Internal debt, 1915, 8,118,263,000 pesetas; 1923, 14,659,000,000. In 1914, there were 1,985,847,000 paper notes in circulation, by June, 1923, these had increased to 4,134,000,000 However, the metallic reserves of the Bank of Spain were 2,525,000,000 pesetas. The period of the War saw a quickening of interest in internal affairs and an increased prosperity. Many joint stock companies, particularly during 1916–17, were formed for industrial enterprises and the government aided by the creation of a commission for the promotion of industry. Also, the external loan placed abroad was taken up by Spaniards so that the great majority of the bonds were held at home. The

application to the domestic coal fields saw a doubling of pre-war production in anthracite and lignite, and though the coal was of an inferior quality, it served very well for the use of the electrified railways which were being extended. The demands for raw materials and foodstuffs from belligerents caused home stringencies and necessitated strict governmental regulation. From 1914 on, the government applied itself to the regulation of cereal exports, the control of domestic prices, the removal of import duties from foodstuffs, the stimulation of agriculture by bounties, etc. In 1917, a general agricultural law was passed for the encouragement of the industry through the creation of a central agricultural loan bank. In 1918, after the failure of local boards of supply to control the traffic in provisions adequately, full powers were given to a commissary general. The rise of prices, the growing intransigency of labor, profiteering, etc., all contributed to a general industrial unrest that took on a revolutionary character. Based on the wholesale prices of 1913 as an index of 100, prices averaged 221 in 1920 and then fell to 190 for 1921, 176 for 1922, and 172 for 1923; for December, 1923, the index was 176. The period of rising prices was therefore accompanied by strikes, many very bitter in character. In 1916 a general strike proclaimed in Valencia by the railroad workers necessitated the calling out of the soldiery; in 1917, the prevailing food shortage led to another general strike with the result that constitutional guarantees were suspended and many labor centres ordered closed. In 1919 some 100,000 workers downed tools in Barcelona, not only in industrial plants but in all public services as well. Terrorism was resorted to and syndicalist agitation was particularly prevalent. The government declared martial law and attempted to mobilize the strikers, but so threatening was the situation that a hasty compromise was agreed on which in effect granted all the workers' demands. In retaliation, the employers declared a lockout in the year which threw out of work some 1,000,000 employees including professional workers and teachers. In subsequent years, with Barcelona as the centre, strikes were sporadic in Saragossa, Bilbao, and Corunna, and even reached the agricultural workers in Andalusia and other regions. In 1922, the postal workers went on strike; in 1923 the transport workers went out in Barcelona for 66 days, and even bank clerks in Madrid left their desks. After 1920, economic conditions took a turn for the worse; the balance of trade became unfavorable; the costs of the unhappy Moroccan campaign were severely felt. The threatening aspect of labor in this year foreshadowed the coup d'état of 1923. The economic condition was reflected in the falling rate of exchange: par value, $.193; 1919 average, $.198; 1920, $.159; 1921, $.135; 1922, $.155; June, 1923, $.146. A tendency for the better was to be seen in the formation of the Catholic Syndicates, a group of coöperative associations, in 1918. By 1921, in 4000 local syndicates, some 600,000 workers were enrolled.

History. The outbreak of the War strongly divided Spanish opinion into two groups: the pro-French Spaniards, who were largely liberal in their tendencies, as well as antimonarchical and anticlerical; and the conservatives, who, because of French expansion in Morocco and the separation of church and state in France, were pro-German in their sympathies. This cleavage and the fact that Spain could not possibly gain anything from war led to the decision to remain aloof from hostilities. The Cortes, meeting in October, 1914, endorsed the general policy, with the result that the country settled down, first to a state of uncertainty because of the fear of suspended food imports, and then to one of complacency as orders for materials began to pour in from France. A steady stream of metals, clothing, and pack-animals, crossing the frontier during the whole period 1914–18, brought, in return, increased prosperity to certain classes. Shipbuilding flourished as well as trading with Allied ports, with the inevitable increase of vessels lost by torpedoing and mines. In 1915 the Dato ministry, in power since 1913, fell and was succeeded by a cabinet made up of the liberal elements headed by Count Romanones. The new government was generally characterized by a pro-Allied attitude, although it took no active steps to lead Germany to a war declaration. On Apr. 20, 1917, Count Romanones resigned, to be followed by Garcia Prieto, leader of another wing of the Liberals, who was more nearly neutral in his tone. The Liberal stay in power was, however, very brief. The demands for a more aggressive policy toward Germany, because of the intensification of its submarine campaign and the unsuccessful attempt on the part of the Spanish government to cause the dissolution of the military juntas which had rapidly spread among the infantry officers, hastened the crisis In June, 1917, Dato (Conservative) was once more called to head a cabinet, and he immediately acceded to the revolutionary demands of the military cliques. Their agitation, fed by the inefficiency of the bureaucracy on the one hand and the increasing arrogance of the military on the other, was to culminate in the events of 1923 Three movements were to march side by side in the subsequent years: the increasing distemper of the laboring classes, manifesting itself in industrial struggles of growing bitterness; the larger part in affairs that the military juntas assumed; and the regionalist movement, centring in Catalonia, whose purpose was a greater measure of local autonomy. From all this agitation it was to be expected that the parties of the Left should adopt an uncompromising attitude. An extensive programme was announced, including greater decentralization, popular election of senators, elimination of the right of the government to suspend the constitutional guarantees and to prorogue Parliament at will, annual meetings of parliament, etc. Labor troubles were frequent throughout 1917, and the demands of the Catalans took on more insistency. Most of the Catalan members of the Cortes met in an assembly at Barcelona on July 19, 1917, to press for reforms. The general strike that followed (July–August) and the forced resignation of the war minister as a result of the intrigues of the Military Committee hastened the fall of the government. Prieto again formed a cabinet of Maurists (extreme Conservatives), Liberals, and Catalanists. A general election took place early in 1918; the government fell at the first meeting of the Cortes on March 18. The high-handed conduct of the war department under La Cierva had precipitated the crisis. Only through the personal influence of the King could a new cabinet be formed. This was made

up of the strongest men in public affairs: Maura (Premier), Dato (Foreign Office), Marina (War), Besada (Finances), Alba (Education), Romanones (Justice). It, too, fell (November 6); it was followed by a short-lived Prieto ministry which in turn was succeeded by a Romanones government on December 3.

The end of the War and the popularity of the democratic doctrines which reverberated around the world were reechoed significantly in Spain. The ministry of public works announced an extensive programme of economic reconstruction. In December, 1918, a Catalan parliamentary delegation issued a manifesto demanding home rule. A general strike broke out in Barcelona early in 1919, hastened on by syndicalist propaganda. The attempt to mobilize the strikers on the one hand, and the desire to propitiate them, on the other, by the appointment of liberal civil authorities at Barcelona, brought the civil and military officials into conflict. The government therefore resigned and a cabinet formed by Maura (Apr 15, 1919) effected a dissolution of the Cortes and a new general election. But Maura was compelled to retire soon after, and the following ministries could maintain only a brief tenure. The machinations of the juntas and the continued industrial conflicts made any permanent civil government an impossibility. In April, 1920, Dato once more headed a ministry His attempt to conciliate the extreme conservatives of his party, i.e. Maura and La Cierva, and the Liberals by a programme of social reform including arbitration, insurance, and land measures, was unavailing, for as a result of the December elections he was left without a majority in the Cortes. His endeavors to reconcile all Conservative elements were occupying him when he was assassinated on Mar. 8, 1921.

From 1921 on, the conduct of the war in Morocco (q.v.) became the leading question in Spain. The increasing taxation and the intolerable censorship, together with reports of disasters that began to drift in, served to antagonize further all classes of opinion against the ruling political leaders. Cabinets continued to change with lightning rapidity. The Maura ministry, embarrassed by the juntas in its handling of the Moroccan War, attempted to force their dissolution and was compelled to resign when the King refused to sign the decree (Jan. 11, 1922). Maura was called back, to last only another two months, and was followed by a Liberal coalition under Guerra The latter immediately became popular by restoring the constitutional guarantees, suspended three years earlier, and by moving against the military juntas On Nov. 14, 1922, a decree was promulgated, ordering their abolition. A prolonged discussion over the responsibility for the disasters of 1921 in Morocco (q.v.), an attempt to impeach the Allende-Salazar ministry under which they had taken place, and demands for such reform of the constitution as would end the suspension of the guarantees, caused the overthrow of the ministry. After great difficulty a new Liberal government was formed under Prieto on December 7. In December a sensation was caused when the former high commissioner of Morocco, General Berenguer, assumed full responsibility and demanded a trial in order that the whole matter might be aired. His charges of inefficient equipment and a general lack of foresight on the part of the administration stirred a country which had already been aroused over the great loss of life and the expenditure of 500,000,000 pesetas. By the middle of 1923 parliamentary commissions investigating the conduct of the campaign were prepared to bring charges against the ministry and the high officers in command as concessions to public opinion. The fear of a coup d'état forced the government to prorogue the Cortes, for the leaders of the hostile movement were military men generally. The further reverses of September, 1923, brought the matter to a head. This, together with the continued labor troubles and the increasing Catalan agitation and the success of Mussolini's dictatorship in Italy, paved the way for a military revolution On September 13, Capt-Gen. Ferdinando Primo de Rivera, in charge of the military at Barcelona, seized the civil administration of the city and forced the resignation of two cabinet ministers offensive to him, and eventually that of the whole Prieto government. It was evident at once that the revolution was not directed at the throne but at the prevailing political methods. The King accepted the situation in this light, for on his arrival in Madrid he requested General Rivera to head the military directorate and form a government. Parliament was dissolved by decree on September 16; the ministerial departments were placed under the permanent undersecretaries; the separatist movement was denounced in a royal decree; trial by jury was suspended, and a strict censorship imposed. The military directorate headed by General Rivera and made up of Generals Adolfo Espasno, Luis Navarro, Luis Hermoso, Dalmacio Rodriguez, Antonio Mayenda, Gomez Jordana, Ruiz Portal, and Mario Muslera, with Admiral Marquis Mavez, exercised the real functions of government First measures were characteristically severe. All local officials were dismissed and new elections ordered. Decrees were promulgated abolishing the salaries of life senators, amending judicial procedure, and establishing a commission for the review of railway administrative methods. The support of the middle classes was demanded under a veiled threat of compulsion The result was the oversubscription on November 5 of 350,000,000 pesetas of treasury bonds That the dictatorship did not contemplate a brief stay in power was indicated when Count Romanones and Don Alvarez, speakers respectively of the Senate and the late Chamber of Deputies, were removed from their posts for petitioning the King to convoke the new Cortes. The lot of the dictatorship was not an easy one. Hostility was evoked by the dissolution of the provincial legislatures, the exile of the popular Professor Unamuno to the Canary Islands, and the failure of the directorate to cope with the repeated Moroccan disasters. By the summer of 1924 it became increasingly evident that de Rivera had neither the ability nor the resources to effect the long-hoped-for restoration of his country. In fact, that a démarche was contemplated was hinted at in the royal decree of July 4 which demilitarized the directorate and modified the dictatorial powers of de Rivera.

Catalan Question. The Catalan question, which had agitated Spain to a greater or less degree for 50 years, came to a head, as indicated above, in the years 1917–19. At first purely sentimental and literary, the movement for home rule had taken on a political and eco-

nomic character. The Catalan language was revived, and the particularistic tone of the agitation became more pronounced. An assembly met in Barcelona in 1917 in defiance of the government and voted resolutions asking for drastic reforms in the constitution. In spite of the arrest of the members attending, the agitation continued. In 1918 a parliamentary delegation of Catalans presented to the Madrid government a full statement of demands. This included delimitation of Catalan territory, to take in the existing four Catalan provinces; definition of the respective limits of the powers of the central government and those of the Catalan and the calling of a Catalan constituent assembly; political, economic, and financial autonomy through the organization of a Catalan government with two chambers; regional control of taxes on mines, forests, railways, and water courses; a court of arbitration for the settlement of disputes between the central and regional authorities. An attempt was made to place this manifesto before President Wilson and the Peace Conference, but the nation-wide hostility which it aroused, together with the threats of the military to apply force and of the middle class to declare an economic boycott, softened the ardor of the intransigeants. Incidentally a large mass of the supporters of the movement fell away when the workers lost interest and became absorbed in the trade union movement. Yet the undercurrent continued to be felt from time to time. From 1921 to 1924 it appeared from the disorders and propaganda prevalent that the movement had lost none of its vitality. Even the decree of Sept. 18, 1923, which at the instance of the military dictatorship inveighed against the separatist movement, had no real effect Whether the Rivera administration meant to apply more forceful measures was not plain in 1924, but it was known that the flamboyant nationalism which it represented did not look kindly on anything but a diffuse localism. At any rate, Catalans were openly hostile to the directorate, going so far, in April, 1924, as to appeal to the League of Nations for intervention.

Foreign Affairs. Domestic concerns during 1914–18 distracted attention from foreign affairs. The result was that the tone of the negotiations carried on with Germany over submarine sinkings never became obstreperous. In 1918 an agreement was reached with Germany for a ton-for-ton indemnity to cover all losses. In 1919 Count Romanones attended the Peace Conference and succeeded in obtaining for Spain a place in the Council of the League of Nations. All talk of a Franco-Spanish alliance, which was current rumor in 1919 and 1920 and was quickened by Count Romanones's presence at the Peace Conference and the King's visit to Paris in 1919, came to naught because of the Spanish pretensions in Tangiers. Spain's desire to assume an important place in foreign affairs and in the Mediterranean in particular was not to be frustrated, for with the assumption of the reins of government by the Directorate, pourparlers were at once commenced with Italy. In November, 1923, the Queen and King, accompanied by General Rivera, were entertained by Italian royalty. A commercial treaty was at once effected, and it appeared certain that Mussolini and Rivera meant to hasten a rapprochement of the two powers for the maintenance of an equilibrium in the Mediterranean. Another question discussed over the period was the negotiation of commercial treaties with France, Germany, Switzerland, Portugal, and the United States. Considerable hard feeling was engendered by the fact that France in 1920 increased all tariffs considerably. The matter was debated in 1921 and 1922 and seemed on the way to solution in 1923 when the government was authorized to negotiate a treaty, but the coup d'état ended all discussion for the time. The same was true of the German and United States treaties which had lapsed in 1922 and 1923 respectively. For Spain's part in the Tangier discussions, see TANGIER CONTROVERSY. See also MOROCCO; ITALY; NAVIES OF THE WORLD.

SPANISH LITERATURE. Spanish literature in the nineteenth century had a veritable renaissance in the drama, the novel, and in lyric poetry, three fields in which Spain had been supreme in the heyday of her Golden Age. To these she added an excellent school of criticism. In all four of these forms of literary activity Spain continued to shine during the first quarter of the twentieth century. The "generation of 1898" was the name applied to the forward-looking group which, while preserving all that was best in their native inheritance, wished to profit by all that was best beyond the borders of their own land. Keen observers saw the lessons to be learned from foreign experience, and patriotic hearts and minds adapted those lessons to the native needs, so that Spanish literature of the first quarter of the century was racially Spanish and typical.

In the novel, two old favorites went into new fields: Blasco Ibáñez gave a series of novels about the War, one of which, *Los Cuatro Ginetes del Apocalipsis*, is remarkable for its grasp of the extent of the racial problems involved; and Pío Baroja gave a series of novels that tend to show the development of liberal ideas in Spain in the nineteenth century. These have been compared, *mutatis mutandis* with the *Episodios Nacionales* of Pérez Galdós.

The novel appears in several attractive fields: the historical novel, the regional novel, the realistic novel, the latter sometimes showing keen analysis of modern problems Ramón María del Valle-Inclán wrote about 30 *cuentos*, and three historical novels dealing with the Carlist War in Galicia. Alejandro Pérez Lugín made a great furore with his *La Casa de la Troya* (Fastenrath prize), which portrays the life of Santiago de Compostela. His subsequent novels *Currito de la Cruz* and *La Corredoira y la Rua* also deal with Galicia, as do those of Francisco Camba, whose *Revolución de Laíño* won the Fastenrath prize (1922). Mauricio López Roberts won the Fastenrath prize (1917) with his *El Verdadero Hogar*, and his *El Ave Blanca* (1922) deals attractively with a strange Basque legend. Guillermo Díaz-Caneja won the Fastenrath prize (1918) with his *El Sobre en Blanco*, while his later novel, *La Virgen Paleta*, was considered his most beautiful work up to that time. Without intending to be so he is a moralist. The Pueyo prize (1922) was awarded to M. D. Benavides, whose *Lamestación* revealed a young author of great promise. Ricardo León was considered by many as being stylistically the author most nearly entitled to be considered the successor of Juan Valera. In subject matter and in manner of treatment he continued the traditions of Alarcón and Pereda. His *El Amor de los*

Amores is a kind of reve sal of *Pepita Jiménez.* Among his latest novels were *Amor de Caridad, Cuentos de Antaño y de Hogaño,* and *Humos de Rey.* Beatriz Galindo (Mrs. Isabel O. de Palencia) wrote one of the most effective books of the year 1923, *El Sembrador Sembró su Semilla . . .*, a fascinating novel and a medically sound study of eugenics. Concha Espina de la Serna, after winning the Fastenrath prize for 1914 with her *La Esfinge Naragata,* was forging rapidly to the front, with *La Rosa de los Vientos, Ruecas de Márfil, El Metal de los Muertos, Despertar para Morir, Dulce Nombre,* and *El Caliz Rojo.* In 1923, the Royal Spanish Academy awarded her the Castillo de Chirel prize, and she was already being spoken of for the Nobel prize.

During the period under consideration, poetry gave us not only the editions of the complete works of such poets as José María Gabriel y Galán, Vincente Medina, and Antonio Machado y Ruiz, but new works of very real worth and inspiration, which drink deep from the fountain of the national life. Francisco Villaespesa gave us *Andalucía, La Maja de Goya,* and *Paz.* J. M. Bello's *Cantigas de Juglaría* exhibit a surprising variety of rhymes and meters; and the polished verse and beautiful thoughts of E. Carballo's *Cancionero de Amor* met with favor. The *Ruta de Ensueño* (1917) of F. Pérez Menéndez Maturana was deemed better than any of his previous work. The *Poemas* (1918) of A. Torre-Ruiz caused him to be hailed as a new poet of real inspiration. Juan de Contreras, Marqués de Lozoya, showed himself to be a graceful versifier with a real inspiration in *Poemas de Añoranzas* (1915), *Sonetos Espirituales* (1918), and *Poemas Castellanos* (1920), the last of which, treating of Segovian legends, won the Fastenrath prize. The great poetic event of 1922 was the discovery of a real poet in the person of an authentic shepherd of Castile, Julián Sánchez Prieto, whose book *En el Chozo* was written in the fields among his sheep.

The drama flourished as one would expect, and some of the best work was done in verse, verse whose charm yields in no respect to the verse of earlier periods. Francisco Villaespesa produced *La Leona de Castilla* (1915), *Abenhumeya, El Rey Galaor, La Maja de Goya,* and *Judith,* the last a Biblical subject which has been fairly popular in Spanish literature. Eduardo Marquina gave us *El Gran Capitán, La Morisca, La Extraña* (1921), *El Pavo Real* (the most beautiful production of the year 1922, and dealing with an exquisitely dainty legend of British India), and in 1923, *Una Noche en Venecia* (a happy combination of profound love and sound thinking, set to verse that needs no musical accompaniment). Antonio Rey Soto, although a churchman, ranks well as a poetic dramatist, as shown by his *Amor que Vence al Amor* (1917) and his mystic tragedy *Cuento del Lar* (1918). Next to Eduardo Marquina, the most graceful dramatic poet was probably Luis Fernández Ardavín, whose works *La Drama del Armiño* (1921), *El Doncel Romántico* (1922), and *Romance de Doña Blanca* (1923), were all very well received. In the nonpoetic drama there is also much excellent work to record. Despite his great age Benito Pérez Galdós won a triumph with his tragicomedy *Santa Juana de Castilla* (1918), as had in 1917 the almost equally aged Catalan dramatist Angel Guimerá with his peace play *Jesús que Vuelve.*

The Alvarez Quintero brothers continue to keep the Spanish stage supplied with their clean, witty light comedies and with occasional pieces of a more serious nature such as *Malvaloca* (crowned by the Academy), *La Calumniada, Ramo de Locura, La Prisa,* and *Cristalina,* all of which, without losing any of the usual charm of the authors, deal with serious questions. Two other authors of note belong to this lighter school, Carlos Arniches (whose *La Tragedia de Marichu* and *La Mala Hora* were very successful), and Pedro Múñoz Seca, who keeps his public in gales of laughter by his unexpected quips and flashes of repartee (for example, in *El Conflicto de Mercedes*), but who can also write for children, as shown by his beautiful *La Muerte del Dragón.*

There still remain four great names connected with the drama in the quarter-century. Jacinto Benavente, from the nature of his work, has been called the Spanish Shakespeare. After 1916 (when he produced *La Ciudad Alegre y Confiada,* which is an exquisite allegory treating the question of national civic preparedness as against personal selfishness) he gave us *La Inmaculada de Dolores, Mefistófela, Los Cachorros, La Ley de los Hijos, La Vestal de Occidente,* and *Por ser con Todos Leal ser para Todos Traidor.* He was awarded the Nobel prize for 1922. Manuel Linares Rivas won a succession of triumphs with his careful studies of vital problems: *Cobardías* (1918, attacking all kinds of moral cowardice), *El Caballero Lobo* (1919), *Almas Brujas, Lo Pasado, Como Dios nos Hizo, Frente a la Vida* (problem of educating middle-class girls to economic efficiency so as to avoid necessity of loveless marriages), and his success of 1923, *La Ma la Ley,* which is a piercing study of a bad inheritance law. In the later years, Gregorio Martínez Sierra was devoting a great deal of his time and talent (and he was ably seconded therein by his talented wife) to staging with exquisite taste the plays of others (e.g. *El Pavo Real* and *Una Noche en Venecia* by Marquina, and *El Conflicto de Mercedes* by Múñoz Seca); but that did not prevent him from doing some creative work, as witness *El Corazón Ciego, Don Juan de España* (a new treatment of an old legend), and *El Grillo del Hogar,* which is a dramatization, with delicate touches, of Dickens's *Cricket on the Hearth.* J. López Pinillos, who wrote under the pen name of Parmeno, worked indefatigably during his last years, as witness *Los Senderos del Mal,* and *Esclavitad* (Piquer prize for 1918), *El Condenado, La Red* (1919, Academy prize in 1921), *Como el Humo, La Tierra,* and *El Caudal de los Hijos* (all produced in 1921, all studying serious problems and the last one treating honor as a spiritual inheritance that parents must hand down unsullied to their children); and then went to his reward, leaving behind him two works for posthumous production: *Los Malcasados* and *Enbrujamiento,* which latter was a tremendous success.

The school of criticism following in the footsteps of Clarín, Menéndez y Pelayo and Valera shows such names as Azorín, Blanca de los Ríos de Lampérez, Carmen de Burgos, E. Díez Canedo, Miguel de Unamuno, Ramón Pérez de Ayala, Ricardo León, Luis Astrana Marín, and the two special followers of Menéndez y Pelayo: Ramón Menéndez Pidal and Adolfo Bonilla y San Martín, each of whom had in turn developed a following.

SPARTACISTS. See COMMUNISM; GERMANY.

SPAULDING, EDWARD GLEASON (1873–). An American philosopher, born at Burlington, Vt., and educated at the University of Vermont and at Bonn in Germany. He taught philosophy in the College of the City of New York from 1900 to 1914 and then became a member of the faculty of Princeton University. For several years he lectured at Woods Hole, Mass. He collaborated with six others in *The New Realism* in 1912 and also wrote *The New Rationalism* in 1918. He served in the Engineers Corps of the United States Army during the War.

SPECTROHELIOGRAPH. See ASTRONOMY.

SPELLACY, THOMAS JOSEPH (1880–). An American lawyer, born at Hartford, Conn. He was graduated from the Law Department of Georgetown University in 1901, and from 1903 practiced law in Hartford. He was active in Democratic politics and from 1915 to 1919 was United States District Attorney. He was Democratic candidate for governor in 1918, and in 1919 served as legal adviser in Europe in the settlement of naval affairs growing out of the War. From 1919 to 1921, he was Assistant Attorney General of the United States. In the election of 1924, he was one of John W. Davis's managers.

SPENCER, ARTHUR COE (1871–). An American geologist, born at Carmel, N. Y. He studied at the Case School of Applied Science, and in 1896 received his Ph.D. at Johns Hopkins. Later entering the service of the United States Geological Survey as assistant geologist, he attained the rank of geologist in 1902. In his official capacity he studied the general geology and ore deposits of Virginia, Colorado, Wyoming, Alaska, and Cuba, and more particularly the zinc and iron deposits in the pre-Cambrian rocks of New Jersey, as well as those of Texas, including the iron ores, and the Triassic iron ores of Pennsylvania. Later he was given charge of the investigation of lands in the Appalachian and White Mountains to determine whether Federal control of lands would promote navigability of dependent streams.

SPENCER, ROBERT (1879–). An American landscape painter, born at Harvard, Neb., and educated at The National Academy of Design in New York and at the New York School of Art. He studied under Chase, DuMond, Henri, Garber, Francis Jones, and F. Luis Mora. Among his numerous awards were the George Innes gold medal of the National Academy of Design (1914), the gold medal of the Boston Art Club (1915), and the gold medal of the Panama-Pacific Exposition (1915). His paintings are permanently hung in the Metropolitan Museum of Art in New York City and in the most important collections of the United States, including those of Chicago, Washington, Pittsburgh, Detroit, and Buffalo. He became a National Academician in 1920.

SPENGLER, OSWALD (1880–). A German scholar and writer on philosophical topics. He received international notoriety through the publication of his *Untergang des Abendlandes, Umrisse einer Morphologie der Weltgeschichte* (2 vols., 1920–22). In this work he attempted to trace a philosophy of history and to predict, on the basis of the postbellum disorganization of Europe, the eclipse of western civilization. His other works include a study of the philosophy of Heraclitus (1904) and a sociological tract on *Preussentum und Sozialismus* (1922).

SPINDEN, HERBERT JOSEPH (1879–). An American anthropologist who was born in Huron, S. D. He did field work for the Peabody Museum of Harvard University in the western States, Mexico, Central America, etc., and was a member of the American Museum of Natural History in New York. He specialized on ancient art and was in charge of the exhibit of industrial art in 1919. He conducted an archæological expedition to Venezuela, which was financed by the Museum of Natural History, in 1915, and published a work on *Ancient Civilizations of Mexico and Central America* (1917).

SPIRE, ANDRÉ (1868–). A French writer of Jewish extraction. He was the leader of a group of Franco-Jewish poets and writers in Paris, who wanted to carry forward the Jewish tradition regardless of language. This school included such men as Henri Franck (died in 1912) and Edmond Fleg, the author of *Ecoute, Israel.* Spire's published works include. *Et J'ai Voulu la Paix, Fournisseurs* (war poems); *Versets: Et Vous Riez, Poèmes Juifs; Les Juifs et la Guerre* and *Quelques Juifs* (critical essays). As a poet Spire reflects a restless and powerful lyricism best characterized in his own words as of a man who "does not know how to love in a dry manner—like a priest."

SPIRITUALIST ASSOCIATION, NATIONAL. An association incorporated in 1893 for the union of local spiritualist societies of the United States into an organization for mutual help and coöperation in charitable, educational, religious, and missionary activity relating to the objects and phenomena of spiritualism. Annual conventions are held in which matters relating to spiritualism are discussed. The Association made progress in membership and financially in the decade 1914–24. Many local churches were built, and a vigorous propaganda was carried on. Ministers to a large extent took the place of the itinerant system in local societies and churches At the annual meeting in 1919, legislation in all States for the protection of the spiritualists as a religious denomination was strongly urged. An advance toward securing a national temple in Washington was made in 1921 by payment in full for a prominent building site. The Association maintains a Spiritualist school, the Morris Pratt Institute, at Whitewater, Wis. Its periodicals include *The Progressive Thinker, The Weekly Banner of Life,* and *The National Spiritualist* (a monthly). It has a membership about 600,000, with some 600 affiliated churches. Its ministers number about 500 and its mediums about 1200. The president is Dr. George B. Warne. The general offices of the Association are in Washington, D. C.

SPITZBERGEN. An Arctic archipelago with a total area of 25,000 square miles, belonging to Norway since 1919. The summer population (1921) was 1315; the winter population (1921–22), 895. The permanent population was made up of inhabitants of five mining camps engaged in the collieries. The interest in the exploitation of the resources of the islands led to considerable scientific research, mainly geological and topographical. As a result of the activities of Norwegian explorers, the mapping of the country was rapidly pushed, while oceanographic research was aided by the interest of the Prince of Monaco. A wireless station was established by the Norwegian gov-

ernment at Green Harbor in 1911; the Germans established a meteorological station near Cross Bay in 1910. Other wireless stations were erected by the English and Swedes in the period 1914–24. The discovery of coal on the archipelago was the initial stimulus to an active interest in the region on the part of British, American, Swedish, Norwegian, and Russian nationals. Further reconnaissances showed the presence of deposits of iron ore, asbestos, alluvial gold, gypsum, colored marble, phosphates, and platinum. Up to 1924 coal, the only mineral regularly worked, had five mines, located at Braganza Bay, Green Harbor, Coles Bay, and Advent Bay (two mines). Prior to the annexation to Norway, the output mined and exported averaged 26,000 tons; in 1922, 297,000 tons were mined. Coal areas preëmpted and claimed by the various nationals were approximately as follows: British companies, 4000 square miles; Norwegian, 900; Swedish, 350; Russian, 100; Dutch, 10. The large American interests had been sold to European companies, and the German holdings, seized by the British during the War, were added to the British estates. Settlements were being regularly laid out; the latest census (1920) showed seven principal towns with the following summer populations: Longyear City, 400; Hiorthavn, 70; Coles Bay, 21; Green Harbor, 209; Cape Boheman, 90; Ny Aalesund, King's Bay, 321; Bell Sound, 240. A postal service was maintained by Norway, and Scandinavian and German tourist boats touched at the harbors during the summer season, June to September.

Partly as a result of Norwegian agitation, the political status of Spitzbergen came frequently before the attention of Europe. Conferences were held in 1910, 1912, and 1916, but without result. Finally, in 1919, Spitzbergen, together with Bear Island, was granted to Norway by the Supreme Council, but under a series of guarantees in the interests of other nationals holding property. The archipelago was not to be used for any military purpose. The ships of all signatories to the treaty, Great Britain, the United States, France, Italy, Japan, Holland, Denmark, Norway, and Sweden, were to enjoy fishing and hunting privileges in territorial waters as well as the right to touch at Norway en route to and from Spitzbergen. A Danish commissioner was to examine claims with regard to disputed estates, and a tribunal of the interested powers was to make final settlements.

SPITZKA, EDWARD ANTHONY (1876–). An American physician, anatomist and psychiatrist, son of Edward C. Spitzka. Born in New York City, he was educated at the College of the City of New York and received his medical degree from Columbia University in 1902. His early years after graduation were devoted to anatomy and especially to brain study. He was connected with the anatomical department of Jefferson Medical College from 1904 and was director of the Daniel Baugh Institute of Anatomy from 1911 to 1914, when he removed to New York to enter upon the practice of neurology and psychiatry. He was for many years identified with brain study in general, with especial reference to comparative anatomy of the brain, including research into the brains of distinguished and abnormal individuals such as Czolgosz, the assassin. He studied especially the action of high-voltage currents on the brain, the effects of electrocution, of reanimation after electric shock, etc., and wrote many papers on these and allied subjects. During the War, he was very active both abroad and at home and was appointed lieutenant-colonel of the Medical Corps and Medical Reserve Corps. His only large contribution is an American edition of *Gray's Anatomy* with notes (1908).

SPLEEN. DISEASES OF THE. See ANÆMIA.

SPOKANE. A city of Washington. The population increased slightly from 104,402 in 1910 to 104,437 in 1920 and to 127,000 for the metropolitan area by the estimate of the Bureau of Census in 1921. A comprehensive industrial expansion took place during the 10 years 1914–24, bringing the number of manufacturing plants up to 325 with an estimated output value of $100,000,000. Building permits and values rose from 687 with a value of $982,227 in 1914 to 2508 with a value of $2,486,568 in 1924. Bank clearings increased from $202,665,546 in 1914 to $578,855,533 in 1923 and deposits increased during the same period from $31,655,855 to $51,844,945. Postal receipts rose from $539,500.98 to $1,116,046.17. In 1914 the jobbing output of Spokane was less than $50,000,000; in 1923 the estimate was placed at $181,000,000.

SPONDYLOTHERAPY. See ABRAMS, ALBERT.

SPORTS. The major sports such as athletics, baseball, football, golf, tennis, etc., will be found treated under their separate heads. This article will confine itself to a brief review of the more important minor sports with special reference to their progress during the 10 years ending with 1924.

Billiards. Every type shared in the general sport "advance." William F. Hoppe remained at the top in the 18.2 balkline game, successfully defending his championship honors against Jacob Schaefer in a challenge match following the international tournament held in 1923 at New York City which resulted in a tie. Ralph Greenleaf retained his title in pocket billiards but in 1923 Cliff Denton wrested the three-cushion championship from Johnny Layton. Edgar T. Appleby was the international amateur 18.2 balkline title holder. It will be noted that all these leading billiard players are Americans. France, Germany and Belgium were all represented in recent tournaments but failed to make impressive showings.

Chess. Dr. Emanuel Lasker of Germany regained his title as champion of the world from José R. Capablanca in an international tournament held in New York City early in 1924. This marked the first time in many years that so representative a gathering of chess masters had been held in the United States and served to stimulate interest in the game The usual intercollegiate chess tourneys in the United States and the customary cable matches between the universities of Oxford and Cambridge in England and Yale and Harvard in America continued to be held annually.

Cricket. Great Britain remained the centre for this game, although it seemed to be growing in popularity in the United States, particularly in New York and Philadelphia. The Free Foresters from England visited the United States and Canada in 1923, winning seven games, drawing two and losing none.

Cycling. As a recreation, cycling apparently is regaining its former hold on public favor despite the advent of the automobile. Cycle racing attracts thousands of spectators especially

in the larger cities of the United States. Velodromes devoted to bicycle competitions of various sorts with seating capacities of from 15,000 to 20,000 have been constructed in recent years in New York City and Newark, N. J.

Fencing and Gymnastics. Fencing is making slow progress, the sport being chiefly confined to a few American colleges and athletic clubs although it has become an attractive feature of the Olympic Games (q.v.). The United States leads in gymnastics, colleges and athletic clubs featuring this sport during the winter months.

Hockey. Hockey is popular in many countries, notably Great Britain, Switzerland, Canada and the United States. Several women's teams have been organized since 1920 and in 1924 American women players made a tour through Great Britain and France, meeting various teams in those countries. Professional hockey flourishes in Canada and in 1924 steps were taken to establish a professional hockey league in the United States, with teams in New York City, Boston and other large centres in the Eastern States.

Skating. Both as a recreation and sport, skating showed growth in popularity and in a sense handicapped the advance of hockey inasmuch as the rinks in the larger cities have such a large patronage that they have proved more profitable for skating alone than for hockey.

Rowing. College rowing in the United States retains its grip, the annual regattas on the Hudson and the Thames attracting throngs of 50,000 spectators The victories scored at Poughkeepsie in 1923 and 1924 by the oarsmen from the University of Washington served to produce nation-wide interest in the sport Rowing contests afford one of the most entertaining features of the Olympic Games (q.v.)

Shooting. The United States, Switzerland, France and Argentina all pay considerable attention to shooting, the team from the United States being victorious in the international championships held in 1924, prior to the Olympic Games of that year.

Wrestling. This had a large following of college men and amateurs in the United States but the professional "game" appears to be losing in popularity. Ed "Strangler" Lewis holds the professional world's championship.

Yachting. The last races in this period for the America's Cup, emblematic of the world's yachting championship, were held in July, 1920, off Sandy Hook The defending yacht was the *Resolute*, owned by members of the New York Yacht Club, and the challenger was the *Shamrock IV*, owned by Sir Thomas Lipton of the Royal Ulster Yacht Club of Belfast, Ireland. Five races were sailed, of which the *Resolute* captured three and the *Shamrock* two. The six-meter team race regatta between British and United States teams of four boats each was held off the Isle of Wight during August, 1923, the British craft triumphing by a score of 120 points to 86.

SPRINGFIELD. A manufacturing city of Massachusetts. The population rose from 88,926 in 1910 to 129,614 in 1920 and to 145,000 by local estimate in 1924. A zoning ordinance dividing the city into distinct use districts was adopted in 1921. In 1922, a new concrete bridge across the Connecticut River was completed at a cost of approximately $6,000,000, including the site; the following year a steel bridge was erected at a cost of $873,000 on the site of the North End bridge, destroyed by fire. The annual Eastern States Agricultural and Industrial Exposition was established at Springfield in 1916. The number of industries increased from 280 in 1914 to 540 in 1924, and the value of output from $31,773,000 to $228,000,000

SPROUL, WILLIAM CAMERON (1870–). An American public official, born at Lancaster, Pa. He was graduated from Swarthmore College in 1891 and for several years was engaged in farming. He afterwards organized several important iron and steel plants and developed numerous railroads, mining, traction and power enterprises in West Virginia. In 1896, he was elected to the Pennsylvania Senate. He was five times re-elected. In 1919, he was elected governor of Pennsylvania, serving until 1923. He took special interest in the development of highways and was known as "the father of good roads in Pennsylvania." Governor Sproul built and endowed the Sproul Observatory at Swarthmore College and restored, at his own expense, the ancient Chester Courthouse, the oldest public building in Pennsylvania.

SPROULE, WILLIAM (?–) An American railway president. He began in the railroad business with the Southern Pacific in 1882, and after holding various positions in the freight department of the Pacific system, became general traffic manager in 1898 In 1910 he became president of Wells Fargo and Company and from September, 1911, to July, 1918, he was director and president of the Southern Pacific Company. During the War the government commandeered his services, and he was put in charge of western railways This work occupied him until December, 1919. In 1920 he resumed the office of director and president of the Southern Pacific Company.

SPURR, JOSIAH EDWARD (1870–). An American geologist, born at Gloucester, Mass. He was graduated from Harvard University and also studied in Berlin During 1893, he was an assistant geologist on the Minnesota Geological and Natural History Survey, and later was connected with the United States Geological Survey as assistant geologist until 1897; thereafter as geologist During 1906–11, he was in consulting practice and in the latter year became vice-president and consulting engineer of the Tonopah Mining Company of Nevada. During the War he served on the committee of mineral imports with the United States Shipping and the War Trade Boards, after which he was chief engineer of War Minerals Investigations for the United States Bureau of Mines. In 1919, he became editor-in-chief of the *Engineering and Mining Journal*. In 1897, he was a delegate to the International Congress of Geology held in St. Petersburg and in 1921 was president of the Mining and Metallurgical Society of America. He is the editor of *Political and Commercial Geology* (1921), and the author of: *The Iron-Bearing Rocks of the Mesabi Range in Minnesota* (1894); *Through the Yukon Gold Diggings* (1900); *Geology Applied to Mining* (1904).

SQUIER, GEORGE OWEN (1865–). An American military engineer, born at Dryden, Mich. He studied at the United States Military Academy and entered the Army as second lieutenant of the 3d Artillery, continuing in the military service until his retirement on Dec. 23, 1923. Meanwhile having shown a decided interest in electromagnetic phenomena, especially as applied to its uses in telegraphy and teleph-

ony, he studied at Johns Hopkins University. Among his military assignments were an appointment as instructor of electricity and mines at the United States Artillery School at Fort Monroe (1895–98); command of the United States cable-ship *Burnside* during the laying of the Philippine cable telegraph system (1900–02); service as chief signal officer, department of California (1902), as chief of signal corps with rank of brigadier-general (1917); and charge of army air service with rank of major-general (1916–18). General Squier's own researches and inventions included studies on the sine waves systems of telegraphy, multiplex telephony and telegraphy over open bare wires laid in the earth or air, tree telephony and telegraphy, and the absorption of electromagnetic waves by living organisms. His attainments were recognized by the John Scott gold medal (1896) and the Elliott Cresson gold medal (1912) of the Franklin Institute For his services in the War he received the Distinguished Service Medal from the United States and was made a Knight Commander of St. Michael and St. George by Great Britain He has written a number of books on aëronautics, including *Military Aeronautics* (1908), and *Aeronautics in the United States* (1918).

STAFF, GENERAL. See ARMIES AND ARMY ORGANIZATION

STAMBULISKY, ALEXANDER (1879–1923). A Bulgarian statesman, born at Slavovitsa, Bulgaria, and educated at Sofia and Halle He became a journalist and in 1902 edited a newspaper of the Agrarian League Later he became a member of the Bulgarian Assembly, and soon acquired great influence in the Agrarian party. He strongly opposed most of King Ferdinand's policies. For this and for his public statement that if King Ferdinand led the country into war again he would lose his throne, Stambulisky was sentenced to prison for life He was released in 1918, however, helped subdue a revolutionary movement among the Bulgarian troops, and later became minister of foreign affairs, although his party did not then have a majority in the cabinet In April, 1920, he headed a cabinet consisting entirely of his own followers, and immediately began putting into effect his plans for solving the economic and financial problems that confronted the government. In October, 1921, under a law enacted by the Stambulisky government, the trial of the war ministers charged with responsibility for Bulgaria's participation in the War as Germany's ally was started. The trial dragged through most of 1922 and resulted in the conviction of 22 ministers. Stambulisky's government announced that the constitution would be revised in such a way as to curtail royal privileges. This aroused the leaders of all the parties, except the Agrarian, and they combined with the army, and with the help of the King, overthrew the government. Stambulisky escaped arrest only by hurried flight, at first being accompanied by a guard of 2000 men, but later being obliged to proceed almost alone He was shot and killed as he was crossing an open field on June 15, 1923.

STANDARDIZATION OF EQUIPMENT See RAILWAYS, *Equipment*

STANDARDIZATION OF FARM PRODUCTS. See AGRICULTURE; CORN; OATS.

STANDARDIZATION OF LUMBER. See FORESTRY

STANDARDS. See COTTON.

STANFORD-BINET SCALE. See MENTAL MEASUREMENT.

STANFORD UNIVERSITY. A nonsectarian, coeducational institution at Stanford University, Cal., founded in 1891. The university grew with great rapidity during the decade 1914–24, both in the size of its student body and in its physical equipment and resources. The enrollment rose from 1879 at the beginning of the period to 3564 at the close, and the faculty from 229 to 468 members. The library increased from 239,122 to 350,000 volumes; Herbert Hoover presented to the university, in 1919, a collection of material on the War, including the official records of the American Relief Association, the Commission for Relief in Belgium and other great relief organizations headed by him; to these were added government documents and publications and archives and collections made for the Food Research Institute. By the beginning of 1924, the Hoover War Library, as it was called, contained over 125,000 titles, and the work of cataloguing the material was progressing rapidly.

The Food Research Institute was founded at Stanford in 1920–21 on endowment from the Carnegie Corporation of New York of approximately $700,000 to be given in annual installments for the succeeding 10 years. Its purpose was the intensive scientific study of the problems of the production, distribution and consumption of food from the wide national and international viewpoint. Three new schools and three new departments also were established and the system of undergraduate instruction was reorganized. The School of Biology was organized in 1922–23 from the departments of anatomy, bacteriology and experimental pathology, biochemistry, botany, entomology, palæontology, psychology, physiology and zoology, and the Food Research Institute and the Hopkins Marine Station. The School of Education was established in 1917 and the School of Nursing was opened in 1922. The department of mining and metallurgy was separated from the department of geology and mining, and the department of political science was established in 1918–19 The departments of Greek and Latin were combined in 1922 to form the department of classical literature.

Many buildings were put up during the decade, including the Thomas Welton Stanford Art Gallery, the new building on the new site of the Hopkins Marine Station, and the Stanford Hospital, costing $500,000, in 1917; a laboratory building for aircraft investigation, and Roble Hall, a dormitory for women, in 1918; a library with capacity of about 700,000 volumes forming the central structure of a new quadrangle, in 1919; the stadium in 1921; the Stanford Union and the basketball pavilion in 1922; and in 1923 a series of dining halls for Encina Hall and two dormitories for men, Toyon Hall, and Branner Hall, which was erected by the board of athletic control from the earnings of the stadium. In 1919, the Stanford Home for Convalescent Children was installed in the old Stanford residence, and an endowment of $100,000 was subscribed in memory of Mrs Stanford. Through the gift of $40,000 of Mrs. Henry Crocker, another unit for 20 beds was in process of construction at the close of 1923.

During the War, the Stanford Naval Base Hospital saw active service in France. In 1915, Dr. John Casper Branner became president suc-

ceeding Dr. David Starr Jordan, who was made chancellor. Dr. Branner was retired in 1916 and was succeeded by Ray Lyman Wilbur, M.D.

STANGE, CARL (1870–). A German Protestant theologian and author (see VOL. XXI.) Among his later works are: *Der Weg zu Gott* (1915); *Wunder- und Heiligengeschichten* (1917); *Die Religion als Erfahrung* (1919); *Luther und das Sittliche Ideal* (1919); *Zum Verstandniss des Christentums* (1920); *Die Ethik Kants* (1920).

STARCH. See CHEMISTRY, ORGANIC.

STARR, FREDERICK (1858–). An American anthropologist (see VOL. XXI). He edited many scientific works and is the author of *Mexico and the United States* (1914); *Dictionary of the Choctaw Language* (1917); *An Early Account of the Choctaw Indian* (1918); *The First Man* (1919); *The Origin of Religion* (1919); *Korean Buddhism: History, Condition, Art* (1919).

STARS. See ASTRONOMY.

STATE FINANCES. The subject of State finances occupied much attention in the decade 1914–24, especially during the latter part of that period. The immense increase in the expenditures of the State governments and their constantly expanding debt were among the most striking features of the financial history of the country. The passage of the Income Tax Law by the provisions of which State and municipal bonds were exempted from taxation (see TAXATION) resulted in a demand for these bonds for the investment of money which met with a ready response by the creation of an immense body of bonded indebtedness on the part of the States. In addition to this, legitimate expenses and expenditures increased during the period. Expansion in educational and social directions called for large additional sums, and the increasing use of automobiles, both as pleasure and commercial vehicles, demanded great expenditures for the construction of highways. For these and other purposes, many of the States greatly increased their bonded indebtedness during the decade.

Comparison is made below of the financial condition of the States in two representative years of the period, 1916 and 1922. The former date is chosen because it reflects the condition that prevailed before the causes that produced the greatly increased expenditures went into effect, and 1922 represents the latest year for which complete figures are available. Both sets of figures are from reports of the Bureau of the Census. The assessed valuation of property subject to general property tax increased from $70,056,003,286 in 1916 to $106,878,258,410 in 1922. This includes real property, personal property and other property subject to taxation.

State	Year	Total Receipts	Total Expenditures	Net Debt	Per Capita
For all States	1916	$783,775,905	$780,550,560	$459,661,269	$4 59
	1922	1,159,445,130	1,280,237,898	879,075,619	8 12
Alabama	1916	11,229,066	11,028,578	13,563,937	5.91
	1922	15,382,249	16,773,944	14,494,198	6 05
Arizona	1916	3,715,998	3,475,417	844,158	3.36
	1922	9,427,044	8,206,435	(Sinking fund assets exceed funded and floating debt)	
Arkansas	1916	4,857,418	4,919,167	1,238,879	0 72
	1922	7,499,970	6,968,667	2,530,062	1 11
California	1916	53,444,236	50,830,629	33,375,559	11 53
	1922	59,620,129	69,311,533	76,243,994	20 93
Colorado	1916	10,205,038	10,117,055	3,753,226	4 02
	1922	13,858,357	16,269,101	9,508,529	9.75
Connecticut	1916	13,340,761	12,257,454	13,064,100	10 72
	1922	21,815,841	20,050,565	6,045,358	4.21
Delaware	1916	1,440,533	1,362,769	796,194	3.76
	1922	4,854,791	5,683,129	5,798,370	25 39
Florida	1916	3,844,604	4,092,623	601,567	0 69
	1922	10,548,273	11,448,418	485,085	0 47
Georgia	1916	13,318,510	13,187,541	6,322,202	2 24
	1922	17,316,714	15,864,279	5,381,702	1.81
Idaho	1916	3,789,023	3,915,046	1,711,537	4 20
	1922	5,767,233	5,301,916	5,515,766	12 08
Illinois	1916	24,442,206	24,974,127	2,066,920	0 34
	1922	45,041,665	52,118,260	12,737,468	1 91
Indiana	1916	15,333,355	14,826,858	767,531	0 27
	1922	25,588,250	24,157,674	425,615	0.14
Iowa	1916	13,544,484	13,622,490	....	....
	1922	31,907,084	32,392,946	185,000	0.08
Kansas	1916	11,428,589	11,070,652	.....	....
	1922	12,380,184	11,529,645	.....	....
Kentucky	1916	14,047,997	13,827,737	2,607,021	1.10
	1922	17,916,665	12,887,368	2,447,309	1.01
Louisiana	1916	10,722,581	10,412,455	13,479,470	7.48
	1922	20,087,477	20,295,482	13,678,819	7 45
Maine	1916	9,016,596	8,666,050	2,637,591	3 44
	1922	13,076,072	15,696,788	12,653,743	16.36
Maryland	1916	15,025,146	15,519,078	16,575,297	12.29
	1922	18,463,312	17,912,835	21,928,588	14.76
Massachusetts	1916	54,966,665	51,739,460	86,042,691	23 52
	1922	51,339,317	42,967,490	75,968,247	19 12
Michigan	1916	36,875,278	33,839,333	6,914,614	2.28
	1922	61,788,256	92,538,443	49,205,551	12.80
Minnesota	1916	26,370,145	26,845,930	1,515,800	0 68
	1922	42,262,517	41,823,616	19,475,800	7 96
Mississippi	1916	6,018,694	6,414,751	5,126,542	2.67
	1922	11,150,513	14,057,383	12,342,561	6.89
Missouri	1916	11,803,505	12,694,102	7,032,839	2.07
	1922	26,870,572	42,232,270	30,307,839	8.83
Montana	1916	13,825,167	14,075,218	1,186,416	2.67
	1922	8,457,638	8,281,224	4,312,551	7.29
Nebraska	1916	8,277,261	7,818,660	.....	....
	1922	14,944,186	12,667,948	.....	....
Nevada	1916	1,923,377	1,813,909	680,000	6.62
	1922	3,237,516	3,208,969	1,602,000	20.70
New Hampshire	1916	3,783,135	3,977,575	1,951,137	4.48
	1922	6,537,382	5,196,100	3,017,809	6.77

State	Year	Total Receipts	Total Expenditures	Net Debt	Per Capita
New Jersey	1916	24,304,053	22,431,268	116,000	0.04
	1922	42,000,608	55,525,897	16,848,603	4.98
New Mexico	1916	5,864,934	4,602,492	2,561,565	6.47
	1922	5,954,809	6,554,988	4,560,668	12.37
New York	1916	114,702,602	121,864,197	148,740,465	14.81
	1922	134,681,260	141,871,167	186,515,461	17.52
North Carolina	1916	7,695,456	7,858,743	8,883,544	3.75
	1922	13,164,249	25,364,112	33,325,898	12.59
North Dakota	1916	10,479,612	9,558,727	511,160	0.70
	1922	8,751,592	11,894,102	5,614,230	8.49
Ohio	1916	23,709,230	25,214,972	5,341,429	1.04
	1922	53,688,447	67,681,926	29,583,581	4.96
Oklahoma	1916	25,479,809	24,255,894	6,416,890	2.99
	1922	14,973,656	15,095,030	3,526,121	1.68
Oregon	1916	6,686,579	6,408,308		
	1922	19,447,935	28,563,652	38,927,223	48.12
Pennsylvania	1916	38,524,289	41,354,099	472,639	0.07
	1922	86,447,839	88,794,424	48,993,640	5.45
Rhode Island	1916	4,285,803	4,348,131	6,390,951	10.60
	1922	7,392,814	7,343,800	9,338,359	15 05
South Carolina	1916	5,230,863	5,118,178	5,386,729	3 35
	1922	8,398,811	7,039,493	5,225,476	3.03
South Dakota	1916	6,402,987	6,141,044		
	1922	11,058,909	18,074,858	14,420,602	22 27
Tennessee	1916	18,663,932	18,804,555	15,863,535	6 98
	1922	15,464,758	15,130,292	17,553,509	7 41
Texas	1916	22,746,723	23,843,152	4,547,694	1 05
	1922	41,858,571	45,842,985	4,102,200	0 85
Utah	1916	6,532,583	7,105,334	2,691,206	6.35
	1922	8,531,166	8,933,404	9,020,000	19 26
Vermont	1916	5,530,106	5,456,425	611,400	1 68
	1922	5,053,236	5,627,900	2,111,532	5 99
Virginia	1916	14,316,915	13,852,503	23,772,497	10 98
	1922	26,501,327	25,132,233	21,205,303	8 96
Washington	1916	15,231,624	14,203 784	1,209,337	0 83
	1922	22,484,807	22,214,909	12,260,432	8 72
West Virginia	1916	11,239,593	10,530,537		
	1922	12,347,621	11,968,895	24,180,665	15 97
Wisconsin	1916	18,031,202	18,250,397	2,151,000	0 86
	1922	37,554,933	34,802,118	2,163,700	0 80
Wyoming	1916	2,032,642	2,023,156	108,000	0 63
	1922	6,598,575	4,990,174	3,776,452	18 37

STATE SOVEREIGNTY. See LAW, PROGRESS OF THE, *Police Power*.

STEAM. See BOILERS.

STEAM AUTOMOBILES. See MOTOR VEHICLES.

STEAM ENGINES AND STEAM TURBINES. In the interval between 1914 and 1924, it was conclusively demonstrated that the reciprocating steam engine, at least in its larger sizes, practically had been supplanted by the steam turbine and the internal-combustion engine (q.v.), especially for central-station work where the increased capacity per unit demanded made it unsuitable for such work under modern conditions. There were, however, notable exceptions to this rather broad statement as to the passing of the steam engine, as will appear in the consideration of the power plants considered later and of such uses as when direct-connected to the rolls in a steel mill, a large reciprocating engine being so installed as late as 1922. The building of a 4200 horse-power twin tandem compound drop-valve engine with a Corliss detached valve gear for a corn-syrup factory, however, was noted in 1922 as the largest direct-connected engine-generator unit that had been built for some time in the United States and this was not exceeded up to 1924.

Furthermore, there were important developments and applications in connection with the type of steam engine known as the Uniflow or Unaflow engine devised in Germany by Professor Stumpf and introduced into the United States in 1914. This engine was distinguished by a cylinder of special design where the flow of steam masses into it on admission and out of it on exhaust with minimum changes of direction. In this way much of the initial condensation of the steam is obviated, as considerable of the moisture in the expanded steam is eliminated at the end of the working stroke and before compression begins. The steam passes out through terminal exhaust slots, and with the piston acting as a valve almost full vacuum can be obtained with the least possible back pressure, so that especially in the case of a condensing engine, there results a substantial economy. In other words, the steam can be compressed to boiler pressure with a minimum amount of work expended during such compression.

In units of less than 1000 kilowatts, the uniflow engine often showed greater economy than a steam turbine, and for capacities of less than 8000 kilowatts it usually was preferable. These engines, both in Europe and America, found wide range of application, from compressors in refrigerating plants, pumps, and electric generators to iron and steel mills. In the year 1920 alone, 40,000 horse power in such engines was said to have been sold in the United States. In 1922, a 2500 horse power uniflow engine was installed in a steel plant, while textile mills and other plants were being similarly equipped. In Germany, Professor Stumpf made a number of successful experiments with locomotives to which he had fitted uniflow engines.

Growth of the Steam Turbine in the United States. In 1907, the total rating of steam engines in the central electric light and power stations in the United States was 1,810,040 horse power, while but 798,025 horse power was credited to steam turbines. In 1917 according to the United States Census, out of a total rating of 8,449,076 horse power in central-station equipment, 1,701,677 horse power was credited to steam engines and 6,747,399 horse power to steam turbines. In 1920, out of an estimated total installation of 11,476,000 horse power, 1,781,100 horse power or 15 5 per cent was credited to steam engines and 9,695,500 horse power or 84.5 per cent to steam turbines.

During this period there was also a marked

increase in the size of the individual units, while there was a corresponding decline in the capacity as well as the number of reciprocating engines. Thus in the 1917 census report referred to, it was stated that practically all the steam engines in both commercial and municipal central stations were to be found in the lowest grouping, namely "500 horse power or under," and the average size of these machines was well under 200 horse power

The statistics quoted above apply only to central stations, but 9,000,000 horse power capacity of the various industries in the super power zone, exclusive of steam and electric railways and central lighting station loads, was analyzed in the Superpower Survey report of the United States Geological Survey in 1921. It was found that of this total two-thirds was privately generated and one-third was purchased. Excluding the central stations from consideration, 68 per cent were steam engines, 19 per cent steam turbines, 8.5 per cent water wheels, and 4.5 per cent internal-combustion engines.

In 1914, the 30,000 kilowatt steam turbine had become recognized practice for central-station installations and the record unit at that time was a 35,000-kilowatt machine for the Philadelphia Electric Company. This was a 13-stage horizontal Curtis turbine, 63 feet 2 inches long, 21 feet 7 inches wide and 15 feet 10 inches high, weighing 600 tons, and taking steam at 215 pounds pressure and 150° super heat, exhausting against an absolute pressure of 1.5 inches of mercury. At that time, however, it was clearly realized that steam turbines of as large capacity as 50,000 kilowatts were feasible and designers then or soon after were working on such units. Even then it was apparent that steam turbines could be used with reduction gearings on land as well as on steamships, and in 1915 a low-pressure turbine was employed as a source of power for a rolling mill by the use of a helical involute gear.

The steam turbine at that time had demonstrated its economy but aside from gaining wider applications the main features now were the constant increase in capacity of the units as built and the tendency to use ever higher pressure, 300 to 350 pounds being the prevailing practice for turbines installed in 1916 and pressures of 500 to 1000 being considered for new designs. This was accompanied by the tendency to use steam at higher temperatures. By 1918, two triple-cylinder compound units of 60,000-kilowatts normal rating and 70,000-kilowatts maximum output, were built, one for the 74th Street Station of the Interborough Rapid Transit Company in New York City, and the other for the Muscle Shoals plant of the Air Nitrates Company. At this time it is interesting to note that on account of the War all orders for steam turbines rated at 700 horse power and over required the approval and supervision of the War Industries Board, the military departments of the government and the munition industries receiving preference.

The War, however, interfered but slightly with the development of the steam turbine, and by 1924 a number of interesting forms of steam-turbine units were developed. Higher pressures and temperatures were used in the effort to secure maximum efficiency. Changes were made in the arrangement of the blading so that machines of greater capacity, more efficient and more rigid, would be secured, also the arrangements for bleeding were standardized and the emergency-governing devices were improved. A recent development was the increased use of the cross-compound type, which, while originally brought out in the United States, had been rather more employed in Europe. In fact, by 1924, there were under construction cross-compound units of both reaction and impulse types of approximately 40,000 to 50,000-kilowatt capacity. With steam being used at 1200 pounds pressure, it was found feasible to design an impulse high-pressure unit on the cross-compound principle, where the exhaust at 350 pounds pressure was supplied to the other units of the station. A notable installation was a 50,000-kilowatt reaction unit in the form of a three-cylinder machine where the high-pressure and intermediate-pressure elements were connected in tandem to a generator, while the low-pressure element was a double-flow unit operating at 1800 revolutions per minute and drove a generator, being really a separate element cross-compound with the other two. Here twin vertical surface condensers were installed on either side of the turbine with their upper waterboxes above the engine room floor. There was reheating of the steam to 700 degrees Fahrenheit after it left the high-pressure turbine, this process taking place in the boiler. With such an arrangement special governing arrangements are employed to prevent overspeeding where the load is reduced suddenly.

For use with steam pressures of 1000 to 1200 pounds the General Electric Company had built two turbines of novel design of 2600 and 4000 kilowatts respectively, where the exhaust was used to supply other turbines at from 250 to 300 pounds. These machines, while simple in design and lending themselves to ready use, required special boiler equipment.

Small auxiliary turbines were developed so as to employ higher steam pressures and temperatures. There was a tendency to employ steel casings in place of those of cast iron, so supporting them that expansion would have comparatively less effect in changing alignments with changing temperatures. These smaller turbines were also given improved speed regulation.

Reference has been made elsewhere to the mercury boiler developed by the General Electric Company and installed at the plant of the Hartford Electric Light Co. (see BOILERS). In this connection, a mercury-vapor turbine was devised as an essential element of this arrangement. See SHIPBUILDING, *Propelling Machinery.*

STEAMSHIP. See SHIPPING; SHIPBUILDING; etc.

STEBBINS, JOEL (1878–). An American astronomer, born at Omaha, Neb. He studied at the University of Nebraska, and while holding a fellowship at Lick Observatory, obtained his Ph.D. at the University of California in 1903. He was assistant in astronomy at the Washburn Observatory of Wisconsin, but in 1903 accepted a call to Illinois, where in 1913 he became professor. He made a specialty of stellar photometry, publishing the results of his investigations in various astronomical journals. The American Academy of Arts and Sciences honored him with the Rumford medals in 1913 and he received the Draper medal of the National Academy of Sciences in 1915. Dr. Stebbins served on the Lick Observatory eclipse expedi-

tion to Labrador in 1905 and also with the similar expedition to Wyoming in 1918.

STEELE, RUFUS (MILAS) (1877–). An American author, born at Hope, Ark., and educated at Pacific Methodist College, Santa Rosa, Cal. He edited various newspapers on the Pacific coast, among them the *San Francisco Call* and the *San Francisco Chronicle.* During the War he was appointed editor of the division of films of the United States Committee on Public Information (1918–19). He has written many motion picture scenarios and has been associated in producing the pictures. He wrote *The City That Is* (1909); *The Fall of Ug—A Masque of Fear,* produced in the Bohemian Grove in California (1913); *Rule G* (1915); *Aces for Industry* (1919).

STEELE, WILBUR DANIEL (1886–). An American author, born at Greensboro, N. C., and educated at the University of Denver, the Museum of Fine Arts in Boston, and the Académie Julien in Paris. He published many short stories in magazines, and in 1914 *Storm* appeared, followed by *Land's End* in 1918. The O. Henry Award Committee awarded him the second prize in 1919 for *They Know Not What They Do,* and in 1921 he received a special award from the same committee for "maintaining highest level of merit for three years among American short story writers."

STEFANSSON, VILHJALMUR (1879–). An Arctic explorer (see VOL. XXI). In 1914 he made a 600-mile sled journey over broken and moving ice from Martin Point, Alaska, to Banks Island, and in 1915 discovered new land north of Prince Patrick Island. The next year he discovered new islands west of Heiberg Island, and in 1917 found that the polar ocean is shallow in the region northwest of Cape Isachsen. He wrote: *The Friendly Arctic* (1921); *Go North, Young Man* (1922); *The Northward Course of Empire* (1922); *Hunters of the Great North* (1922), etc.

STEINACH, EUGEN (1862–). An Austrian physiologist who became famous in connection with the possibility of rejuvenating elderly animals and men through grafting the sexual glands of young animals and latterly through simple division or ligation of the efferent duct. Born at Hohen Ems, Vorarlberg, Steinach was educated at the University of Vienna (M.D. 1886) and in 1895 was appointed professor of physiology in the German University of Prague. He fitted up a laboratory for the study of comparative physiology—the first of its type in the German-speaking countries. Building on a foundation laid by the labors of two French scientists, Ancel and Bouin, he performed many experiments on rats with extraordinary results. When made professor of physiology in Vienna he was placed at the head of a special biological research institute and continued his labors. Steinach is not himself a surgeon, and gland operations on men were performed by Viennese surgeons who also reported the cases. Steinach's only book is his small manual dealing with experiments on rats only, *Verjungung durch Experimentelle Neubelebung der Aelternden Pubertatsdrusen* (1920). Books on Steinach's work have been written by several authors. See SECRETIONS, INTERNAL.

STEINER, EDWARD ALFRED (1866–). An American sociologist, born at Vienna, Austria. He was educated in the public schools of that city and at Heidelberg University. He also took postgraduate courses at other German universities and at Oberlin College. In 1891, he was ordained to the Congregational ministry and was pastor of several churches in Ohio and Minnesota. In 1903, he became professor of applied Christianity at Grinnell College, Iowa. Professor Steiner wrote: *Tolstoy the Man* (1903); *On the Trail of the Immigrant* (1906); *Against the Current* (1910); *From Alien to Citizen* (1914); *Nationalizing America* (1916); *Old Trails and New Borders* (1921).

STEINER, RUDOLPH (1861–1925) German social philosopher. He was born at Krajevic, Jugo-Slavia. He was a commentator and editor of Goethe and an enthusiast for Hindu philosophy and mysticism. He became the German exponent of what is popularly known as theosophy but what he preferred to call anthroposophy. He founded several centres for the spread of this learning, of which the most important is the Goetheanum in South Germany, and a periodical, *Lucifer-Gnosis.* Like the French philosopher Comte, he sought to make humanity an emotional object of worship, in imitation of the established religions. His followers were subject to mild persecution. After the War, Steiner was one of the leaders of the democratic intellectuals. He preached international reconciliation and the renunciation on Germany's part of any attempt at world dominion. Steiner's works included: *Goethe als Vater einer Neuen Aesthetik* (1889); *Wahrheit und Wissen* (1892); *Philosophie der Freiheit* (1894); *Friedrich Nietzsche* (1895); *Goethes Weltanschauung* (1897); *Haeckel und Seine Gegner* (1908); *Lyrik der Gegenwart* (1900); *Welt und Lebensanschauung der 19en Jahrunderts* (1900); *Die Mystik* (1904); *Theosophie* (1904); *Die Kernpunkte der Sozialen Frage in den Lebensnotwendigkeiten der Gegenwart und Zukunft* (1921); *Die Hetze gegen das Goetheanum* (1921). Two volumes of *Mystery Plays* were published in English (1920).

STEINMAN, DAVID BARNARD (1886–). An American civil engineer, born in New York City. He studied at the College of the City of New York and at Columbia University. During 1910–14, he was professor of civil engineering at the University of Idaho, then had charge of the department of civil and mechanical engineering at the College of the City of New York (1917–20). In 1921, he identified himself with consulting practice in New York City, and made a specialty of constructing bridges. Among his notable works are the continuous bridge of 1550 feet at Sciotoville, Ohio, the Hell Gate arch bridge over the East River, New York City, and the suspension bridge at Florianopolis, Brazil. He was also the engineer in charge of the Detroit-Windsor suspension bridge. He was awarded the gold medal (1920) of the American Society of Civil Engineers. In addition to numerous articles contributed to the journals of his profession, he is the author of *Suspension Bridges and Cantilevers* (1911); *Theory of Arches and Suspension Bridges* (1914); *Plain and Reinforced Concrete Arches* (1915); *Design and Construction of Suspension Bridges* (1922).

STEINMETZ, CHARLES PROTEUS (1865–1923). An American electrical engineer (see VOL. XXI). Among his later publications are *America and the New Epoch* (1916); *Theory and Calculation of Electric Circuits* (1917); *Theory and Calculation of Electrical Apparatus* (1917).

STEKEL, WILHELM (1868–). An Austrian psychiatrist and psychoanalyst, one of the best known of Freud's disciples. Born at Bojan, Bukowina, he received his medical degree from the University of Vienna. Since 1908, he has shown almost unparalleled literary activity and announced several years ago that he had subjected over 10,000 individuals to psychoanalysis. Of his numerous writings, the majority have been translated into English although with more or less change in title. Most of the following are numbers in a series of volumes still incomplete: *Nervose Aengstzustände und ihre Behandlung* (1908); *Die Sprache der Traume* (1911); *Die Traume der Dichter* (1912); *Der Will zum Schlaf* (1915); *Onanie und Homosexualitat* (1917); *Die Geschlechtskalte der Frau* (1920); *Die Impotenz des Mannes* (1920); *Psychosexuelle Infantilismus* (1922). These volumes are part of a great system which deals with all disorders of affective and impulsive life.

STELLAR EVOLUTION. See ASTRONOMY; PHYSICS.

STEPHENS, JAMES (1882–). An Irish poet and novelist, born in County Dublin. He became a solicitor's clerk in London. In his spare time he wrote verse and fiction and showed marked ability in both. His writings include: *Insurrections* (1909); *The Hill of Visions* (1912); *The Charwoman's Daughter* (1912); *Here Are Ladies* (1913); *The Rocky Road to Dublin* (1915), *Songs from the Clay* (1915); *Reincarnation* (1918), etc.

STEREOCHEMISTRY. See CHEMISTRY, ORGANIC.

STERN, L. WILLIAM (1871–). A German psychologist (see VOL. XXI). His work after the War was devoted chiefly to mental testing and to the psychology and philosophy of personality. Both of these interests, though largely ignored by the Wundtian psychology of the last generation, were quite popular in postwar Germany. Stern's works after 1914 include: *Vorgedanke zu Weltanschauung* (1915); *Die Psychologie und das Personalismus* (1917); *Grundgedanke der Personalistische Philosophie* (1918); *Die Intelligenz der Kinder und Jugendliche* (1920).

STERNE, ELAINE (1894–). An American photoplay writer, born in New York City, and educated at Columbia University She wrote more than 60 photoplays, among them the *Sunny Jim* series and *The Gang.* Her photoplay *The Sins of the Mothers* brought her a prize of $1000 in 1914, and *Without Hope* a second prize of $500. In the Collier short-story contest of 1914 she won a prize of $250. She is the author of: *Sunny Jim* (1916); *The Road of Ambition,* a novel (1917); and *Over the Seas for Uncle Sam* (1918).

STEVENS, EDWARD FLETCHER (1860–). An American architect, born at Dunstable, Mass. He studied design at the Massachusetts Institute of Technology and in several offices in Boston and New York. After practicing in Rome for several years he became a member of the firm of Stevens and Lee of Boston and Toronto. He planned over one hundred hospitals and institutions in various cities and designed also overseas hospitals during the War and was a member of the special committee appointed to revise the plans of army hospitals. He was a member of the American Institute of Architects, and other organizations, and was the author of *The American Hospital of the Twentieth Century* (rev. ed., 1921).

STEVENS, GORHAM PHILLIPS (1876–). An American architect, born in Staten Island. He studied architecture at the Massachusetts Institute of Technology and in Europe. After a year's service with McKim, Mead and White, he was Carnegie fellow in architecture at the American School of Classical Studies in Athens (1903–05). In 1911 and again in 1918 he was director of the American Academy in Rome, and from 1912 to 1918 was director of the School of Fine Arts at that institution. From the latter year he was professor in charge. Besides being a member of many societies, he was the author of *Life of Charles F. McKim,* and of contributions on Greek architecture to various scientific journals

STEVENS INSTITUTE OF TECHNOLOGY. A nonsectarian institution for men at Castle Point, Hoboken, N. J., founded in 1870. The enrollment of the institute increased from 453 in 1915 to 614 in 1922, and dropped again to 530 in 1923; the faculty was increased from 37 to 55, and the library from 11,000 to 16,000 volumes, all on technical subjects A United States Navy Steam Engineering School was established in 1918; the department of electrical engineering was moved in 1921 to the larger of the two barracks buildings bought from the government, and the space so vacated in the main laboratory building was given to the department of physics; comprehensive examinations in elementary and advanced mathematics were made requirements for entrance for applicants offering certificate credits for admission. Four scholarships were endowed for $40,000 by the alumni in memory of Stevens men who had died in the service during the War, and an endowment campaign for increase of salaries was begun. A new gymnasium was built, and two acres adjoining the main buildings bought in 1915, making in all about 22 acres and including the original "Stevens Castle." President, Alexander Crombie Humphreys, E.D., M.E., Sc. D., LL D.

STEWART, DONALD OGDEN (1894–). An American humorist, born at Columbus, Ohio, and educated at Yale University According to his own story, he was so well equipped for a business career that he turned to literature, and wrote: *Parody Outline of History; Perfect Behavior* (1922); *Aunt Polly's Story of Mankind* (1923) During the War he served as chief quartermaster in the United States Navy

STEWART, JULIUS L (1855–1919). An American painter, born in Philadelphia. He studied under Gerome and Madrazo in Paris, where he lived the greater part of his life. He was known as a figure and genre painter, his style being decidedly French in finish, but his characterizations of American types were excellent, particularly his studies of members of the American colony in Paris. He was a member of the executive and advisory committee of the St. Louis Exposition in 1904, and his work won several awards.

STIDGER, WILLIAM LEROY (1885–). An American clergyman and author, born at Moundsville, W. Va., and educated at Brown University and Boston University. He was ordained in the Methodist Episcopal ministry in 1914 and went to San Francisco, where he preached till 1916. After three years at San José, he went to the Far East under the auspices of the Methodist

Centenary. He served during the War as a truck driver in France for the Y. M. C. A. His writings include: *Giant Hours with Poet Preachers* (1918); *Soldier Silhouettes* (1919); *Star Dust from the Dugouts* (1919); *Outdoor Men and Minds* (1920); *Standing Room Only* (1921); *Flash Lights of the Seven Seas* (1921); *Flames of Faith* (1922); *There are Sermons in Books* (1922); *Henry Ford, the Man and His Motives* (1923); *The Symphonic Sermon* (1923).

STILLMAN, JOHN MAXSON (1850–1923). An American chemist, born in New York City. After graduating from the University of California, he studied at Strassburg and Würzburg, and later received a higher degree in California (Ph.D., 1885). He was instructor in chemistry at the University of California (1876–82), chemist of the Boston Sugar Refining Company (1882–87), and with the Standard Sugar Refining Company (1887–91). In 1891, he became a member of the first faculty of Stanford University, and in 1913 was made vice president, an appointment which he held until his retirement under the age limit as emeritus in 1917. His original investigations included researches in both organic chemistry and mineral chemistry, but his most important work was on the history of chemistry and included a life of *Paracelsus, as Physician, Chemist, and Reformer* (1920), and a manuscript volume on *The Story of Early Chemistry* (1924).

STINNES, HUGO (1870–1924). A German industrialist and financier, born at Mülheim, Germany. At 19 years of age, he entered the mining company owned by his father in Westphalia, where he remained two years. He then organized his own company, called Hugo Stinnes, Ltd, the whole original share capital being 50,000 marks (about $12,000). His first important success was the creating of the German-Luxemburger Mining and Foundry Corporation —the first exemplification of his famous "vertical trust" building. The company owned its own coal, its own ore, and its foundries for the manufacture of its product through all its stages. He extended his holdings to ships and became the most important shipping man in Germany. He organized great companies for making iron and steel, he bought forests, chateaus, hotels, railroads. He owned the largest oil concession in the Argentine, the great electrical plants that are the power centre of Rhenish-Westphalian industry, lime kilns, tanneries, sugar refineries, moving-picture concerns, and vast lands in South America. When the War came, Stinnes grasped the tremendous opportunity to add to his power. He was partially responsible for the ruthless industrial exploitation of occupied Belgium. He supplied war materials of all kinds. Then he began to make his influence felt in the political field. He was elected to the Reichstag in 1920, and about the same time bought many of the leading German newspapers, and large interests in paper-manufacturing establishments. In 1921, he was busy with a scheme for a supertrust that would control every industry in Germany and regulate production, transportation, and the supply of the German markets as well as those of the whole world. His financial manœuvres were made possible only by the steady depreciation of the German currency, deliberately bringing that about by preventing the stabilization of the German mark and repeatedly borrowing money only to pay it back in inflated paper.

STOCKER, HARRY EMILIUS (1876–). An American clergyman and author, born at Nazareth, Pa., and educated at the Moravian College at Bethlehem, Pa. He was a teacher in the public schools of Pennsylvania for a time and was ordained to the Moravian ministry in 1902. After holding several pastorates, he taught in the Moravian College in Bethlehem for a year, and then became pastor of the First Church in New York City in 1919. He was a member of the administrative committee of the Federal Council of Churches and held offices in many Moravian church organizations. His writings include: *History of the White River Indian Mission in Indiana* (1917); *Moravian Customs and Other Matters of Interest* (1918); *History of the Moravian Church in New York City* (1921), etc.

STODDARD, (THEODORE) LOTHROP (1883–). An American author, born at Brookline, Mass., and educated at Harvard University. He was admitted to the bar in Massachusetts in 1908. His writings include: *The French Revolution in San Domingo* (1914); *Present-Day Europe—Its National States of Mind* (1917); *The Stakes of the War* (1918); *Harper's Pictorial Library of the World War,* Vol. VI; *The World at War* (1919); *The Rising Tide of Color Against White World-Supremacy* (1920); *The New World of Islam* (1921); *The Revolt against Civilization* (1922).

STOESSEL, ALBERT FREDERICK (1894–). An American violinist and conductor, born at St. Louis, Mo. From 1910–1913, he studied the violin under W. Hess and E. Wirth at the Hochschule für Musik in Berlin, where he made his début in 1913. After the outbreak of the War he returned to the United States, making his American début with the St. Louis Symphony Orchestra (1915). In 1917, he enlisted in the army and was appointed director of the School for Bandmasters. After his return, in 1919, he became assistant conductor of the New York Oratorio Society, and in 1921 was elected regular conductor. In 1923, he was appointed head of the newly established Department of Music at New York University. His compositions include a string quintet and smaller pieces for violin and piano.

STOKES, ANSON PHELPS (1874–). An American educator, born at New Brighton, Staten Island, N. Y. He was graduated from Yale in 1896 and from the Episcopal Theological Seminary in 1900. After spending several years in travel he was appointed secretary of Yale University in 1899, where he remained until 1921. He was ordained in the Protestant Episcopal Church in 1900 and from that year to 1918 was assistant minister of St. Paul's Church, New Haven. From 1917 to 1919, he was chairman of the trustees of the American University Union in Europe, and was secretary and chairman of the educational commission of the Phelps Stokes Foundation. He was also a member of the General Education Board and was a trustee of many educational and missionary societies. He organized the Army Educational Commission and was founder of the National Commission for Mental Hygiene. He was decorated by several foreign governments for his work. He is the author of: *Memorials of Eminent Yale Men; What Jesus Christ Thought of Himself; Historic Universities in a Democracy; A Visit to Yale in China;* and *Yale and New Haven.*

STOKES, HAROLD PHELPS (1887–). An American newspaper writer, born in New York City. After graduating from Yale in 1909, he spent several years in travel in Europe and the Far East, then began newspaper work in New York with the *Evening Post.* He was Albany and Washington correspondent for that paper and was also its representative at the Peace Conference in Paris. During the War he served with the field artillery and took part in several of the most important campaigns in France. In 1919, he became Washington correspondent of the *Evening Post.*

STONE. Between 1914 and 1924 there was a considerable increase in the amount of stone produced by the quarries of the United States, though the output varied considerably with building conditions, especially during the War.

In 1923, about 107,200,000 tons of stone valued at $161,600,000 were produced in the United States, an increase of nearly 17 per cent from the largest recorded output, namely, that of 1916, and a total value greater than that for 1920, which was $133,541,960. The distribution of the various kinds of stone produced in 1923 as regards quantity and values is shown in the accompanying tabulation. Each of these items varies with special conditions Thus the sale of crushed stone, which represents more than half the stone quarried, depends in large measure upon its use as railway ballast, for road metal and for concrete, and in all of these fields there was an increase in 1923. Likewise, the demand for building stone, which includes granite, sandstone and marble, is closely related to the building situation, and here there was an improvement at the end of the 10-year period. During this interval there had been a decrease in the amount of stone sold for flagging, but a tendency was noted to use flagstone more and more for its decorative value.

STONE SOLD IN THE UNITED STATES IN 1923

Use	Estimate for 1923 Quantity	Value
Building stone, cubic ft.	29,600,000	$34,150,000
Approx. equiv. in short tons	2,340,000	.....
Monumental stone, cubic ft.	4,863,000	17,670,000
Approx equiv. in short tons	407,000	.....
Paving blocks, number	46,070,000	33,980,000
Approx. equiv in short tons	481,000	.....
Curbing, cubic ft	4,138,000	2,856,000
Approx. equiv. in short tons	340,000	.....
Flagging, cubic ft.	628,000	476,000
Approx equiv. in short tons	52,000	.....
Rubble, short tons	800,000	1,200,000
Riprap, short tons	2,200,000	1,800,000
Crushed stone, short tons	66,000,000	67,000,000
Furnace flux (limestone and marble), long tons	24,400,000	22,700,000
Equivalent in short tons	27,730,000	.....
Refractory stone (ganister, mica schist, and dolomite), short tons	1,131,000	1,548,000
Manufacturing industries (limestone and marble), short tons		
Other uses, short tons	5,720,000	8,500,000
Total (quantities approximate, in short tons)	107,200,000	161,600,000

STONE, HARLAN FISKE (1872–). An American educator and public official (see VOL. XXI). From 1910 to 1924, he was dean of the School of Law at Columbia University. He was a member of the Legislative Drafting Research Fund and frequently acted as adviser before legislative committees in both the State and national governments. Amherst College conferred a degree (LL.D.) upon him in 1913. He was appointed, by President Coolidge, in March, 1924, Attorney-General of the United States to succeed H. M. Daugherty.

STONER, WINIFRED SACKVILLE, JR. (MRS. CHARLES P. DE BRUCHE) (1902–). An American author, born at Norfolk, Va., and educated by her mother, who founded the "National Education System." With her mother, Miss Stoner demonstrated this system throughout the United States. When but seven years of age she published a book of verses and in the next year an Esperanto version of Mother Goose. She has written a dozen books, among them being: *Journeys with Fairy Christmas* (1911); *Facts in Jingles* (1914); *Valuable Fur-bearing Animals* (1916); *Sweetest Songs of the Air Kingdom* (1917); *History of the United States* (1919); *Giants of Old* (1919), etc. She has also written scenarios, plays, and songs.

STORAGE BATTERIES. See MOTOR VEHICLES.

STORRS, LUCIUS SEYMOUR (1869–). An American railway official, born at Buffalo, N. Y., and educated at the University of Nebraska. After holding various important positions with several railway organizations, he became the vice president of the New York, New Haven, and Hartford Railroad in 1914. He was president of the American Electric Railway Association in 1917 and chairman of the committee on national defense of that association, controlling coöperation of electric railways through the National Council of Defense.

STOVALL, PLEASANT ALEXANDER (1857–). An American diplomat, born at Augusta, Ga., and educated at the University of Georgia. He edited the *Athens Georgian, Augusta Chronicle,* and *Savannah Press,* and became the owner of the last-named. He was elected to the Georgia House of Representatives in 1902 and again in 1912–13. He was appointed to represent the United States in Switzerland from 1913 to 1920. In 1891 he wrote a *Life of Robert Toombs.*

STRAITS SETTLEMENTS. A British colony comprising the island of Singapore, the island of Penang (with the land settlements of Province Wellesley), and Malacca, on the western coast of the Malay peninsula. Total area, 1600 square miles; total population in 1911, 714,069. In 1921 the population was 881,939, divided as follows: Singapore, 423,768; Penang, 304,572; Malacca, 153,599. Males numbered 557,838; females, 324,101. In 1918 there were in the Settlements 274,574 Malays, 432,764 Chinese, and 94,213 British Indians. Immigrants in 1921 were 191,043 Chinese and 45,673 Indians. In the period 1914–22, deaths outnumbered births.

Industry and Trade. The increasing attention which the natives gave to rubber cultivation to the exclusion of food crops, particularly rice, led to the dependence on imports for consumption needs. Difficulties ensued when the United States restricted its importation of rubber in 1918 and when neighboring countries, because of crop shortages, failed to send sufficient quantities of rice. Other industries declining in the face of the growing rubber culture were coconut, clove, nutmeg, and gambier. The leading activity continued to be commerce, for the Settlements are one of the most important transshipment and trading points in the world. Imports and exports for typical years, inclusive of treasure and trade with Federated Malay States, were: for 1913, £55,936,472 and £45,-

375,132; for 1920, £148,187,421 and £119,471,984; for 1921, £68,126,020 and £58,025,105; for 1922, £68,584,002 and £63,360,888. Fifty per cent of the total trade came from or went to the British Empire. Of the 1922 trade, 75 per cent was handled through Singapore, 22 per cent through Penang, and 2 per cent through Malacca. Principal imports in 1922, in order of value, were rice and other grains, tin ore, cotton goods, tobacco, cigars and cigarettes, fish, sugar, petroleum, and coal. Principal exports were rubber and gums, tin, copra, spices and pepper, tapioca, pineapples, and rattans Trade with the United States in 1922, imports from the United States, $5,623,206; exports to the United States, $93,350,441; in 1923, imports, $7,352,567; exports, $153,790,206. In 1913 shipping entered and cleared, exclusive of native craft, was 27,125,000 tons, of which 15,251,000 were British. In 1921 25,056,000 tons entered and cleared the ports of the territory. In 1923 a causeway was completed across the Johore Straits to connect Singapore with the mainland. This made through train service between Bangkok, Siam, and Singapore possible.

Government finances showed increases over the period Revenues for 1913 and 1921 were £1,446,403 and £4,613,669; expenditures, £1,221,338 and £4,133,604. The debt totaled, on Jan 1, 1922, £18,658,000. An important source of revenue was the government monopoly of opium The governor of the Settlements was also high commissioner for the Federated Malay States (q.v.), as well as for Brunei, and was the British agent for North Borneo and Sarawak.

British North Borneo. A British protectorate on the island of Borneo under the jurisdiction of the British North Borneo Company. Area, 31,106 square miles; population (1911), 208,183, mainly Mohammedan settlers and native aborigines Europeans numbered 355; Chinese, 26,002. Revenues for 1913 were £210,197 and for 1921, £372,119; expenditures for the same years were £259,494 and £440,058. Imports for the years 1913, 1920, and 1921 were £634,538, £1,284,438, and £900,668. Exports for the same years were £863,115, £1,405,771, and £923,616 Rubber, tobacco, and timber, shipped to Singapore and Hongkong, were the most important exports. Opium, an official monopoly, was one of the leading sources of revenue.

Brunei. A British protectorate southwest of British North Borneo. Area, 4000 square miles; population (1921), 24,454, of whom 35 were Europeans and 1434 Chinese. Exports were cutch (mangrove extract), coal, rubber, and sago. Oil was discovered, but not in paying quantities. There was a wireless station at Brunei.

Sarawak. A British protectorate southwest of Brunei. Area, 42,000 square miles; population (estimated), 600,000. Imports in 1921, £1,501,000; exports, £1,788,000. Chief exports were sago, pepper, rubber, liquid fuel, and gold. Trade was with Singapore. Revenues in 1921 were £331,000 (from customs, opium, gambling, arrack, and pawn farm taxes); expenditures, £272,000.

History. In March, 1924, the British government announced the abandonment, in the interests of economy, of the projected naval base at Singapore. The scheme first was originated in 1922 and was a direct outcome of the Washington Conference at which Great Britain guaranteed not to increase her naval base of Hongkong and to give up Wei-hai-wei, looked on as a potential base. To protect, therefore, communications with Australia and New Zealand, and to defend the right flank of her Indian possessions, the fortification of Singapore was regarded favorably by the Imperial Conference of 1923 and was written into the naval schemes of the Law and Baldwin governments. Macdonald's decision was received with misgivings by the Australian and New Zealand governments, which expressed great concern over their safety.

STRATEGY AND TACTICS, MILITARY. Military strategy is the science and art of projecting and directing important military movements and operations with the object of securing advantageous positions of supply, attack, defense or retreat, and deals in general with large forces not engaged in battle Military tactics is the science and art of leading and manœuvring troops on the battlefield or its immediate vicinity. The goal of both is the same, the defeat of the enemy by the delivery of the most powerful blow possible at his weakest point, or, when acting on the defense, to prevent or successfully resist such an attempt by the enemy.

Changes in Tactics Developed in the War. The basic principles of strategy were little affected by the test of the War. Although on a far greater scale than ever before, the mobilization of the armies and their movement into position for attack or defense did not differ essentially from the methods that had been employed in previous wars The tactics employed, however, underwent some modification, owing to the increase in fire power of weapons in use at the outbreak of the War, and the introduction of new weapons and other novel war material

In early days, before the invention of firearms, shock action was almost entirely depended upon for the decision, which required tactics utilizing the troops in masses or columns. The introduction of firearms and their gradual improvement resulted in fire power and movement becoming the predominant factors, and brought about deployment of troops on a wide front in order to secure them. Experience teaches that under present conditions neither shock action nor fire power alone can win, the two must be used in combination, and modern tactics endeavors to provide means whereby fire power may be utilized to open the way for shock action to strike the decisive blow This blow should be directed at the enemy's weakest point, if it can be determined in the initial deployment, otherwise a mobile force must be held in readiness to launch an attack against the weak point when it is revealed.

During the first phase of the War, before the lines became stabilized, the tactics used in combat were those which had been inculcated in peace-time training, the deployment of infantry being made with considerable strength in the skirmish line in order to secure fire superiority and the advance being made by successive rushes of assaulting units, the attack being supported by artillery fire. The increase in rapidity and precision of artillery fire and the effective use of machine guns caused a thinning of the assault line and the organization of the attacking force in greater depth, in order to minimize losses. This change in formation also gave greater power of manœuvre.

In defense the tactics were similarly modified. After the first phase when the lines became stabilized on the Western front, both sides occupied nearly continuous front-line trenches extending from Switzerland to the Channel, strongly garrisoned, dependence being placed on the fire power of this line supported by an artillery barrage to repel the enemy's attack. The heavy losses and almost complete destruction of the front-line trenches due to the artillery preparatory fire of the attacking troops led to the adoption of a modified organization of the terrain whereby the front line was held weakly by outposts with a main line of resistance at the rear so located that the attacking forces would be more or less disrupted when it was reached and would be beyond effective support by their artillery and consequently more easily repulsed by counterattack.

Therefore organization in depth was adopted for defense as well as for offense. The conditions which brought about these changes were those due to the introduction of new weapons and devices and a supply of ammunition in greater quantity than ever before.

Airplanes and tanks and the utilization of gas were the major influences, to which should be added improved machine guns, automatic rifles, light mortars and the 37-millimeter gun as integral parts of the fighting equipment of the infantry.

Airplanes. At the beginning of the War, airplanes were few in number and were used practically entirely for reconnoissance. Very rapidly, however, their use was extended to include observation and direction of artillery fire, location of front-line units, photographing the enemy positions and transmitting orders and, in certain cases, the carrying of supplies to isolated units. Then machine guns were mounted on them and combat planes were developed which fought aërial battles to decide the supremacy of the air and deny to the enemy the aërial observation which had become so important. It was also found that bombs could be dropped from them and that by such means strategic points in the enemy's rear could be effectively attacked. As these various uses developed to a greater and greater extent, it was found even practicable to attack the enemy troops on the battlefield with machine-gun fire and bombs. See AËRONAUTICS.

The use of anti-aircraft guns and of machine guns to prevent observation and destroy the airplanes did not prove of great value. Very few airplanes were destroyed by such means, although well-directed fire forced the airplanes to heights where observation was imperfect, and it was found that the most effective way to keep the enemy airplanes in check was to fight them in the air by combat planes in superior force. The control of artillery fire by aërial observation was a tactical change of signal value.

Captive Balloons. These were also effectively used for observation and control of artillery fire, although, to avoid destruction by enemy artillery and airplanes, they had to be kept well in the rear. However, under favorable weather conditions, observation was good and the advantages of a stationary position and direct wire communication were great.

Dirigibles. The great cost, long time of construction, large target offered and special landing arrangements required prevented dirigibles from successful employment and extended use during the War, even though they could carry large quantities of explosives and supplies. Their principal use and success was in naval warfare.

Tanks. Armored motor cars with machine guns mounted were developed before the War and under certain conditions were effective in reconnoissance and for courier service, but they could operate effectively only on roads in fair condition. The invention of the tank produced a machine that could operate across country, destroy wire entanglements, cross trenches, break down light walls and which, armed with one-pounders or machine guns proved a very useful aid to the infantry in attack, heavy tanks usually preceding the infantry to open ways through obstacles and cover the infantry during the cleaning up of a captured position, light tanks usually accompanying the infantry to support them in their attack, and destroy machine-gun nests.

Gas. The introduction of gas also had an influence on tactics. The cloud attack in which gas was first used, and later the concentration of gas on certain areas by means of gas shells, assisted an attacking force by compelling the enemy to remain in shelters during the advance or fight when handicapped by wearing masks Many kinds of gas were used during the War, from the early irritating and suffocating types such as chlorine and phosgene to lachrymal and blistering types, as benzyl bromide and mustard gas. The most effective were phosgene and mustard gas, although tear gas and other types were of value under certain conditions.

As a development from the introduction of gas came the use of smoke clouds to screen the advance of an attacking line or to cut off observation by the enemy. See CHEMICAL WARFARE.

Infantry Weapons. *The automatic rifle*, introduced during the War, provided means for maintaining the fire power of the thinner skirmish line and enabled concentrated fire to be delivered on appropriate targets. Its value in holding attacks, and in covering weak points in defensive positions, has been proved.

Machine Guns. At the beginning of the War, machine guns had not been perfected, were comparatively few in number and the technic of their employment was in an experimental stage. At that time the German Army was greatly superior both in number of machine guns and in trained gunners. The improvements developed as the War progressed increased their reliability of functioning, and experience led to methods of use which rendered them tremendously effective both in offensive and defensive action, in the former case assisting the attacking skirmish line to achieve and maintain fire superiority as well as at times supporting the advance by indirect barrage fire over the heads of the advancing troops, and in the latter case delaying and disrupting the attacking forces by concentrations from concealed positions and by flanking fire delivered along the belts of wire in front of strong points and centres of resistance. In open warfare they proved most valuable in delaying rear-guard actions. See SMALL ARMS AND MACHINE GUNS.

Hand Grenades. The position warfare, which lasted so long on the Western front, called for weapons that could deliver high angle fire in order to reach narrow trenches at short range.

To fill this need was developed the hand grenade, at first a crude can filled with explosive and fired by a time fuse. From this beginning came the offensive grenade, with a thin metal case whose fragments could not injure the thrower but which produced the desired effect on the enemy by the shock of the explosion; and the defensive grenade, thrown from a protected position, with a heavy metal case which, when the grenade burst, broke into fragments and added the effect of the flying pieces to the shock of the explosion Later improvements resulted in grenades filled with various gases and chemicals for special uses. The invention of the method of discharging grenades by rifle fire from a cup placed on the muzzle of the rifle increased very greatly the range and accuracy of fire.

Trench Mortars and One-Pounder Guns. Another weapon developed for high angle fire was the trench mortar varying from the 3-inch light Stokes mortar capable for brief intervals of firing 40 or more 12-pound shells a minute up to 6-inch, 8-inch and larger mortars firing heavier shells at a lesser rate of fire with greater range and more destructive effect. These mortars, especially the light ones, which could be fired from concealed positions close up to the skirmish line of an attacking force, proved very effective against machine-gun nests.

The 37-mm. or one-pounder gun was introduced and also proved effective against machine-gun nests and, when supplied with special ammunition, was useful against light tanks

Infantry Equipment. In consequence of the successful development of the weapons above described, the equipment of a rifle squad in the United States Army in 1924 included one automatic rifle and one grenade discharger A howitzer company was assigned to each infantry regiment equipped with three light mortars and three 37-mm guns.

Tactical Value of Tanks. The value of tanks as an auxiliary arm of the infantry was demonstrated during the War. In the organization of the United States Army in 1924, one light tank company was an integral part of an Infantry Division. The company included a headquarters section with one signal tank and nine reserve tanks, and three platoons each with five tanks, two armed with 37-mm. guns and three with machine guns. Light tanks are transported on trucks as close as possible to the battle front.

Other Changes in Tactics. The changes in infantry tactics were accompanied by some changes in artillery tactics, indirect firing being developed to a high degree of perfection. The interdependence of the infantry and the artillery was emphasized and close liaison between the two arms was found most important. In order to conceal battery positions from aerial observation, effective methods of camouflage were developed. The rolling barrage to precede the leading infantry waves in an attack was perfected and was made possible by a supply of ammunition such as never had been available before.

In defensive positions the importance of field guns which could be rapidly advanced to bring direct fire on tanks was recognized, as was the desirability of accompanying guns to advance with the infantry to assist in reducing enemy strong points too heavily fortified to be destroyed by the infantry weapons.

Cavalry tactics were hardly affected by the War, as the conditions of warfare after the battle of the Marne did not permit the utilization of cavalry to any important degree. It seems apparent that the future use of cavalry will be in open warfare largely as a screen for the movements of the armies and for reconnoissance in conjunction with the air service. Cavalry patrols can secure information by contact with enemy patrols and from captured prisoners which airplanes cannot obtain, while airplanes can quickly relay to headquarters the information picked up by the cavalry as well as that which they can obtain by direct observation and aërial photographs.

The tactical value of leadership and morale, of training and discipline, of accurate, well-aimed rifle and machine-gun fire, of team work by adjacent units and of effective and reliable intercommunication was impressively revealed in the War. See ARMIES AND ARMY ORGANIZATION; ARTILLERY; ORDNANCE; CHEMICAL WARFARE; WAR IN EUROPE; etc.

STRATON, JOHN ROACH (1875–). An American clergyman, born at Evansville, Ind., and educated at Southern Baptist Theological Seminary at Louisville, Ky. After being ordained to the Baptist ministry in 1900, he held pastorates in Chicago and Baltimore; in 1918 he came to the Calvary Church in New York City. He won the $1000 prize offered by the Commercial Club of Portland, Ore., for an essay on *Portland and the Northwest*, and a $500 prize offered by the Anti-Saloon League. During 1923 he assailed Dr. C Woelfkin on proposed abrogation of immersion, vainly attempted to prevent Dr. W. H. P. Faunce (whom he denounced as a heretic) from addressing the Northern Baptist Convention, and asserted that the Union Theological Seminary was a breeder of revolutionary ideas in religion. He attracted considerable attention in the spring of 1924 by a series of debates with Dr. Charles Francis Potter, Unitarian and modernist. His writings include: *The Menace of Immorality in Church and State* (1920); *The Heavenly Home* (1920); *The Gardens of Life* (1921); *Church vs. Stage* (1921); *Our Relapse Into Paganism* (1921); *Dance of Death* (1922).

STRATTON, SAMUEL WESLEY (1861–). An American physicist, born at Litchfield, Ill. He was graduated at the University of Illinois in 1884, where in 1886 he became instructor of mathematics and physics and in 1889 professor of physics and electrical engineering. He was later called to the University of Chicago where he attained the full professorship of physics in 1898, and continued in that capacity until 1901 when he organized the United States Bureau of Standards at Washington; he was director of the Bureau until 1923. In that year, he accepted the presidency of the Massachusetts Institute of Technology. In 1895, he joined the Naval Militia of Illinois, of which he became lieutenant-commander; he served during the Spanish-American War in the United States Navy with the rank of lieutenant. During 1904–12, he commanded the District of Columbia Naval Militia. He was secretary of the committee for aëronautics and a member of the Executive Board of the National Research Council during the War. The Elliott Cresson medal of the Franklin Institute was conferred on him in 1912 and in 1917 he received the Public Welfare medal of the National Academy

of Sciences. Dr. Stratton became a member of the International Commission on Weights and Measures and in 1923 was a member of the United States Assay Commission.

STRAUSS, RICHARD (1864–). A German composer (see VOL. XXI). After his *Alpensymphonie* (1915) he wrote very little, and none of the later works fulfilled the hope that he would again reach the high level of the masterpieces of his second period. While he preserves his strong individuality, uninfluenced by either Impressionism or Futurism, as well as his marvelous command of all technical resources, the irresistible melodious sweep and flaming passion of his earlier works are missing. His powers of thematic invention have declined. His latest works are: a revised version of *Ariadne auf Naxos* (Vienna, 1916); a new opera, *Die Frau ohne Schatten* (Vienna, 1919); a second ballet, *Schlagobers* (Vienna, 1924); a suite for small orchestra, *Der Burger als Edelmann* (arranged from *Ariadne auf Naxos*); and some songs. Neither the revised nor the new opera had much success, while the ballet was received with favor. The suite, however, is exquisite The songs cannot bear comparison with his earlier masterpieces in the same field. In November and December of 1921, he visited the United States for the second time, producing his own works exclusively With several of the great orchestras he conducted his orchestral masterpieces, and in conjunction with other artists appeared as pianist in his chamber music and songs. It is significant that the programmes he offered contained practically nothing written after 1900.

STREET CLEANING. See ROADS AND PAVEMENTS.

STREET RAILWAYS. See MUNICIPAL OWNERSHIP.

STREETS. See ROADS AND PAVEMENTS.

STRESEMANN, GUSTAV (1878–). A German statesman, educated at the universities of Berlin and Leipzig. When he entered the Reichstag in 1907, he was general-manager of an important union of manufacturers, and was identified with the great industrial leaders, such as Hugo Stinnes, who were the mainstay of the German People's party. He was at one time chairman of the Foreign Relations Committee. In August, 1923, he was asked to form a ministry During the time he was in office the Bavarian revolt occurred, and there was much disorder throughout Germany. He announced that the distress of the German people might be alleviated by a cessation of resistance in the Ruhr and the return of the Crown Prince. His views caused the downfall of his government in November, 1923, and Dr. Wilhelm Marx was asked to form a new cabinet. Dr. Stresemann was given the post of Minister of Defense in the new government. See GERMANY, *History*; REPARATIONS.

STREUVELS, STIJN (FRANK LATEUR) (1871–). A Flemish author, born in Heule, West Flanders. He was a baker at Avelghem until 1905. He wrote in the West Flanders dialect and was said to be the most distinguished Low Dutch author of his time. His writings include: *Het glornerijke Licht* (*The Glorious Light*) (1912); *Openlucht* (1905); *De Vlaschaard* (1908). The last two books were translated into English by A. Teixeira de Mattos and published in 1915 under the title *The Path of Life.* He also wrote many short stories.

STRIKES AND LOCKOUTS. A survey of labor disputes during the decade 1913–23 brings out two sharply contrasted periods: the war years, when efforts to promote patriotic coöperation between capital and labor reduced the number of strikes to a markedly low level; and the post-war period, when, with generally unsettled conditions and a diminished effort for arbitration, the number of strikes and the number of persons affected rose quickly, in many countries to a hitherto unprecedented figure. An interesting experiment during the period was the effort of the Australian states to prohibit strikes and lockouts, although the original act did not prove satisfactory and was replaced in 1918 by a new measure which made strikes illegal only in certain specified industries and public agencies and where walkouts occur within 14 days after notice of intention to strike. Another interesting movement was the step taken by employers in Germany and the Scandinavian countries to insure themselves against strikes, as an offset, they claimed, to the protection that the worker had in his strike benefits. See PICKETING, SABOTAGE, and INJUNCTION.

United States. A strike marked by much violence occurred in 1913–14 among the Colorado coal miners, giving rise to several sanguinary conflicts and the burning of a tent colony in which two women and 11 children were suffocated. While the objects of this strike—better working conditions, eight-hour day, higher wages, and recognition of the union—were not gained after more than a year of struggle, a Federal investigation of the situation uncovered conditions at the mines which were obviously in need of remedy and the operators were threatened with Federal intervention if outbreaks continued to occur. In the same year there were serious disorders in connection with a strike among the coal miners of West Virginia and the silk workers of Paterson. During the period immediately preceding the entrance of the United States into the War, strikes became numerous, partly because the workers sought to secure for themselves a share of the large war profits, in part because it seemed opportune to demand the betterment of conditions, and perhaps to some small extent because of the activities of foreign agents. In 1916, four railroad brotherhoods and the railway representatives came to a deadlock. In the arbitrations that followed, President Wilson's plan, which was accepted by the men, was rejected by the railroads, this situation bringing about the passage of the Adamson law, fixing the legal standard of a day's work at eight hours, and forcing the railroads to acceptance. During the War, in an organized effort to substitute mediation for the strike and lockout, thus obviating loss of time in that emergency, a Committee on Labor of the Advisory Commission of the Council of National Defense was formed, in 1917, with Samuel Gompers, president of the American Federation of Labor, as chairman, and with subcommittees on various phases of the question, such as wages and hours, mediation and conciliation, welfare work, cost of living, and domestic economy. A Labor Adjustment Committee, consisting of three representatives each of the government, employers, and employees, was created, and immediately made itself felt in preventing threatened strikes in the west coast shipyards and among the

east coast longshoremen; it finally effected a settlement of the strike in the copper mines of the Southwest. In connection with the latter strike, a wholesale, unauthorized deportation of miners—some of them members of the I. W. W. (q.v.)—from Jerome and Bisbee, Ariz., caused a great stir. About this time a general disorganization of the lumber industry in the Northwest by strikes gained for the workers the eight-hour day. An outbreak among machinists engaged on war work at Bridgeport was, in spite of concessions to the workers, finally quieted only by an ultimatum threatening blacklisting of the men from all war work. This period, which had been one of comparative quietude, was broken by the Armistice. In 1919, in Seattle, 25,000 shipyard workers went out, bringing on a general strike in that city which affected about 60,000 workmen. It was unsuccessful. When the Boston policemen in that year went out on strike to secure recognition of their union, their posts were filled by other men. Another unsuccessful attempt to compel recognition of a union was that of the steel workers, about 300,000 of whom walked out in September, 1919. Judge Gary refused to confer with the union leaders on the grounds that they were not representative of a large number of the workers. Federal troops were finally called in before the men returned to work. In New York City, in 1919, there was an actors' and a longshoremen's strike, and a printers' lockout. In that year a strike among bituminous coal miners, affecting about 425,000 men, was called off after two weeks, and the difficulties settled after six weeks upon the terms proposed by President Wilson. There were 125 unauthorized strikes, in 1919, affecting 1,053,256 men. Of the 4,154,733 workers who were involved in all strike movements in that year (1919), not less than 400,000 were in the clothing trades, 178,000 in textile work in New Jersey and New England, 330,000 in shipyards, 430,000 in the building trades A serious strike, in 1922, tied up practically the entire coal industry. For the first time, anthracite and bituminous mines were simultaneously affected. The walkout, following attempts to reduce wages, began on March 31. The bituminous strike ended August 15; the anthracite miners did not return until the beginning of September (see COAL). In August, 610,000 men were out. There was an outbreak of violence at Herrin, Ill., following the shooting of two union pickets by armed guards; 19 nonunion miners were killed and 30 wounded by an armed mob. Both bituminous and anthracite strikes were terminated by an extension of previous contracts from Mar. 31, 1922, to a date in 1923, and by agreements for further conference. As a result of this situation, and fulfilling one of the conditions on which the men went back to work, in September, 1922, Congress created the United States Coal Commission for the purpose of investigating all phases of the production, transportation and distribution of coal, and relationships between operator and worker, with a view to recommending remedial legislation. This year was notable also for the nation-wide strike among railway shopmen, involving 400,000 men and seriously tying up the entire transportation system. Beginning July 1 as a protest against reduction in wages, it finally resolved itself into a fight for the restoration of seniority rights to those who had gone on strike. On September 11, 16 railways came to terms with their workers, both agreeing to abide by the decisions of the Railroad Labor Board. Those railroads which refused to settle had so far succeeded in building up their shop forces as to be beyond the necessity of dealing with the strikers, although some of these roads were under the necessity of guarding their employees for some time thereafter. A strike of 155,000 anthracite miners in Pennsylvania in 1923 lasted only 10 days, the workers gaining a 10 per cent increase of wages but being denied the check-off and the closed shop. The pressmen's strike in New York City, September 18–26 of that year, was significant from the point of view of union discipline: the local union having defied the authority of the main

RELATION OF WORKERS TO LABOR UNIONS, 1916 TO 1923

Relations of workers to unions	Number of disputes							
	1916	1917	1918	1919	1920	1921	1922	1923
Connected with unions	2,458	2,392	1,903	2,030	2,502	2,036	[a] 813	[b] 1,213
Not connected with unions	416	209	362	143	137	62	37	77
Organized after dispute	71	55	26	30	8	5	5	18
Not reported	814	1,794	1,062	1,374	652	279	209	154
Total	3,789	4,450	3,353	3,577	3,299	2,382	[a] 1,064	[b] 1,462

[a] Not including 12 disputes which included both union and nonunion workers and 4 in which the strikers withdrew from the unions after the strike began.
[b] Not including 29 disputes which included both union and nonunion workers in 2 of which the nonunion strikers joined unions after the dispute began

RESULTS OF DISPUTES ENDING IN EACH YEAR, 1916 TO 1923

Result	Number of disputes ending in—							
	1916	1917	1918	1919	1920	1921	1922	1923
In favor of employers	748	395	465	680	650	701	242	356
In favor of employees	749	631	627	583	397	256	237	364
Compromised	777	720	691	797	448	291	104	167
Employees returned pending arbitration	73	137	204	50	61	80	16	46
Not reported	101	191	211	57	204	198	112	159
Total	2,448	2,074	2,198	2,167	1,760	1,526	711	1,092

The approximate total duration of 2116 disputes ending in 1916 for which duration was reported as 49,680 days, or an average duration of 23 days each.
In 1917 the total duration of 1435 such disputes was 26,981 days, or an average duration of 19 days each. In 1918 the total duration of 1709 disputes was 29,895 days, or an average of 17 days each. In 1919 the total duration of 1855 disputes was 62,930 days, or an average of 34 days each. In 1920 the total duration of 1321 disputes was 51,893 days, or an average duration of 39 days each. In 1921 the total duration of 1258 disputes was 64,231 days, or an average duration of 51 days each In 1922 the total duration of 552 disputes was 21,017 days, or an average of 38 days each. In 1923 the total duration of 917 disputes was 21,406 days, or an average of 23 days each.

body, its charter was canceled, and the international organization supplied pressmen to fill the strikers' places.

The accompanying table and paragraph summarizing the labor disputes during the years 1916–23 are from the *Monthly Labor Review* of the Department of Labor, June, 1924. See TRADE UNIONISM, LABOR ARBITRATION, COAL, and RAILWAYS.

Other Countries. The figures for disputes in the United Kingdom from 1907 to 1920 show a tendency toward gradual increase, with a temporary falling off during the War. In 1913, there were 1497 disputes, affecting directly and indirectly 689,000 working people, with an aggregate duration of 11,631,000 working days. In 1916, these figures had fallen to 578, 281,000 and 2,581,000, respectively. In 1919, there were 1413 disputes, involving 2,515,000 people, with a duration of 34,903,000 days; in 1920, 1715 disputes, 1,932,000 workers, 27,011,000 days. The latter two years, due to the industrial unrest in 1919 and the great coal strikes in 1920, were practically peak years, except in point of aggregate duration, the record for which was reached during the coal strike of 1912. Among the more important strikes of the period was the Dublin strike in 1913–14, to uphold the principle of the sympathetic strike, or practical boycott of offending employers by other trades. This was noteworthy as the nearest approach to a general strike in British history; it involved even agriculture. The Munitions Act in 1915 made many strikes illegal, and this, together with public opinion, restricted for some time the extent of strikes and their duration. Even well into 1919, in spite of prevalent disturbance, there was no strike of great importance, until the railway strike beginning in September. The wage question which caused this difficulty was referred to a conference, the strike coming to an end after nine days. There was a national coal strike in 1920, followed by a more serious strike in 1921 that lasted for four months, and was terminated only by a government grant subsidizing wages in the industry, for three months, up to a maximum of £10,000,000. This strike also led to the passage of an act enabling exceptional measures to be taken in an emergency to protect the public from being deprived of the essentials of life. Among the other more important strikes abroad during this period, the following may be mentioned: 1914, London building trade, Yorkshire coal miners, railway employees in South Africa; 1915, miners in South Wales, and the Silesian coal miners and Berlin tool makers in Germany; 1916, Great Britain, jute workers of Dundee; Norway, a general strike protesting against compulsory arbitration of disputes; Spain, a railroad and general strike; 1917, an unprecedented number of short strikes in Japan, many as protest against the high cost of food; 1918, Great Britain, engineering trades, colliery examiners in South Wales, cotton trade, London metropolitan police force; 1919, coal miners, iron workers, shipbuilders; Italy, general strike in Naples; Spain, lockouts and strikes in all the chief industries; Sweden, printers, match makers, and a lockout in the woodworking trades; 1920, Great Britain, cotton textile strike.

STRONG, WILLIAM WALKER (1883–). An American physicist, born at Good Hope, Pa. He studied at Dickinson College, and at Johns Hopkins. He was a Carnegie assistant in physics at Johns Hopkins and during 1911–13, professor of electric theory at the University of Pittsburgh. In 1913, he became president of the Scientific Instrument and Electric Machine Company. During the War he developed a fume mask for poisonous gases, and in 1921, discovered the effect of magnetic psychoanalysis. In addition to many papers contributed to scientific journals, he wrote *The Absorption Spectra of Solutions* (2 vols., 1910, 1911), *The New Science of Fundamental Physics* (1918), and *The New Philosophy of Modern Science* (1920).

STRUCTURAL GEOLOGY. See GEOLOGY.

STRUCTURALISM. See CONSCIOUSNESS AND THE UNCONSCIOUS.

STURTEVANT, ALFRED HENRY (1891–). An American zoölogist, born at Jacksonville, Ill. He was educated at Columbia University. In 1915, he became research associate of the Carnegie Institution of Washington. He collaborated with Morgan in extensive researches on genetics, especially of the fruit fly, and published a number of papers dealing with the taxonomy and genetics of this animal. He was joint author (with Muller, Bridges and Morgan) of *The Mechanism of Mendelian Heredity* (2d ed., 1923).

STYRIA. A province of the Republic of Austria. Its area in 1910 was 8658.4 square miles; in 1923, 6323 square miles. Its population in 1910 was 1,444,157; in 1923, 977,350. See AUSTRIAN REPUBLIC.

SUBLIMATION. See CONSCIOUSNESS AND THE UNCONSCIOUS.

SUBMARINES AND THEIR WAR ACTIVITIES. The use of the submarine boat as a commerce destroyer was not a part of Germany's original plans for the War. The U-boats which had been completed and tested before the outbreak of the war were so unsatisfactory that Admiral von Tirpitz, the German naval chief, was highly skeptical as to their usefulness. Their first cruises against the British forces, in which 2 out of 10 were lost without inflicting any damage on their adversaries, seemed to confirm his views. Few new boats were ordered, and no special effort was made to hasten their construction. But on Sept. 22, 1914, Lieutenant Weddigen in the *U-9* sank in one hour a whole division of three 12,000-ton armored cruisers (*Aboukir*, *Hogue*, and *Cressy*), with a loss of 1400 men. The effect of this achievement was instantaneous, both in England and Germany. The British navy had made no definite plans to combat submarine activity. Extremists like Admiral Sir Percy Scott declared that no adequate measures were possible; extremists of the opposite view considered the submarine too ineffective to require such plans. Von Tirpitz was converted at once; not only was he converted, but he soon became the leading advocate of submarines in Germany. New boats in great numbers were ordered, and the earlier ones were taken in hand to remove their defects, as far as that could be done.

While this work was going on, the idea of using sumbarines against shipping was quickly conceived and developed. It was estimated that by Feb. 1, 1915, the repairs to the old boats would be completed and a number of the smaller new ones would be ready for service. On February 4 the Germans declared that the waters surrounding Great Britain and Ireland

would be a war zone in which enemy merchant ships would be destroyed, and that it would not always be possible to avoid danger to passengers and crew and even to neutral ships. Owing to a sharp protest from the United States, the declaration was modified in regard to neutral ships, their neutral character to be judged by all circumstances and not simply by the flag carried. As thus changed, it was put into effect on February 18.

After the sinking of a number of cargo and fishing vessels, the British passenger steamer *Falaba*, bound to Sierra Leone, was torpedoed on March 27 with the loss of 100 lives. On May 7, before the storm of protests which this evoked had died down, the great passenger liner *Lusitania* was torpedoed without warning and sank in 20 minutes with a loss of life at first reported as 1396 but afterward thought to be about 1200. Nearly 300 Americans were on board, and many were drowned. The protests over the *Falaba* affair were as nothing compared to those now aroused. The United States was deeply stirred and came near to declaring war against Germany, but the country was unprepared for war and did not even start to prepare for it until 1917, after war was admitted to be inevitable

The American protests were met by the usual German promises, though even the Chancellor was convinced of the danger of making an active enemy of the United States, and on June 15 an imperial order was issued, forbidding the sinking of large passenger vessels Von Tirpitz and the naval staff fought the order so furiously as to somewhat weaken imperial support of it. Encouraged by this, the naval instructions to submarines were apparently relaxed; for on August 19 the large British passenger steamer *Arabic*, outward bound, was sunk off the Irish Coast with the loss of 44 lives. The United States again protested strongly, and the German government apologized, quoting the statement of the submarine commander that the *Arabic* was apparently trying to ram him, and also repeating (September 2) their previous assurance that liners would not be sunk without warning and without safety of the lives of noncombatants, provided that the liners did not try to escape or offer resistance. Two days later, September 4, the liner *Hesperian* was sunk with the loss of 32 lives. The German government denied that she was destroyed by a submarine, but the proof seemed clear.

During the year the Germans sank various American cargo vessels for which they agreed to pay, but up to 1924 had never done so. The Chancellor now forced Von Tirpitz to stop sinking liners, and on September 20, further orders were issued, suspending operations except in the North Sea. This condition of affairs remained unchanged until after the close of 1915, notwithstanding the arguments and protests of Von Tirpitz and the naval staff. But on Feb. 12, 1916, the German government issued a memorandum declaring that after February 29, merchant vessels armed with guns would be treated as belligerents On March 24, the channel steamer *Sussex*, with 325 passengers, about 25 of them Americans, was torpedoed. Though it was not sunk, 80 persons were killed and injured. Following this, President Wilson threatened to break off diplomatic relations altogether, "unless the German government should now immediately declare and effect an abandonment of its present methods of submarine warfare against passenger and freight carrying vessels." The German reply concluded with the statement that German naval forces had received an order that vessels would not be sunk without warning and the saving of life unless they should attempt to escape or offer resistance; but if the United States failed to secure the "freedom of the seas" from Great Britain, the "German Government would then be facing a new situation in which it must reserve to itself complete liberty of decision." Although this proviso made the promise as to methods of warfare absolutely valueless except for the brief interval before Germany would decide that the United States had not obtained from Great Britain the "freedom of the seas"—an impossible absurdity—it was accepted by the President, who said he would "rely on a scrupulous execution henceforth of the now altered policy."

Fear of American hostility, or doubt of its success, held Germany back from unrestricted submarine warfare until the beginning of 1917, when the naval staff persuaded the government that it would be so effective as to starve the British people until they demanded peace. Fears of the United States were declared groundless. That country had evidently no warlike intentions, for it was wholly unprepared for war, and nothing of importance was being done to remedy this situation. The political campaign of 1916 had been won on an anti-war platform by the aid of pacifists and pro-Germans, and as late as December the President had made a speech in which he told the people not to lose their heads over talk of preparedness. "Moreover," the naval staff said, "the submarines would stop any attempts to transport troops to Europe before Great Britain was brought to her knees." A note to the Allies on December 12, proposing negotiations for peace, was rejected by them; and on Jan. 9, 1917, it was decided to commence unrestricted warfare on February 1. The new decision was publicly announced on January 31. While other areas were added later, the rough outlines of the war zone, as defined by the announcement, within which submarine warfare was to be unrestricted, included all north European waters between the meridians of 4° E. and 20° W. longitude, and between the latitudes of the Faroe Islands and Cape Finisterre, except over narrow lanes along the coasts of Holland and Spain, the Zone also included all the Mediterranean except areas along the Spanish coast and a lane 20 miles wide leading to Greece. The last phase of the blockade was now reached. The United States at once broke off diplomatic relations with Germany. On February 3, the American Ambassador left Berlin and on the same date the German Ambassador at Washington was handed his passports; but the declaration of war was deferred until April 6 in the futile hope that Germany would rescind her decree.

Germany had now about 140 submarines ready for service and many more building; 269 were ordered in 1917, and the construction work on submarines and destroyers was pushed to the limits of the shipyard capacity The total tonnage of Allied and neutral merchant vessels sunk during each month increased from 291,000 in January to 464,000 in February; 507,000 in March; and 834,000 in April. The tonnage sunk

in May dropped to 549,000; in June, it was 631,000; in July, 492,000; in August, 480,000; in September, 315,000; in October, 429,000; in November, 259,000; and in December, 350,000. During 1918, it steadily decreased, with slight fluctuations, to 106,000 in October. Sixty-six German submarines were sunk in 1917 and 74 in 1918. In the early days of unrestricted warfare, the antisubmarine forces were inadequate in number either for patrol or convoy, but this number grew steadily, and the system of patrol and convoy was soon vastly improved. Depth bombs were supplied in constantly increasing quantities, and methods for their discharge were perfected. Aircraft became more and more valuable, especially for sighting submarines when submerged Allied submarines increased in number and gained in effectiveness Decoy vessels (Q-ships), P-boats, sub-chasers, sloops, trawlers, mine-sweepers, booms, mine-fields, paravanes, camouflage, and zigzag steering played their parts. But the most important vessels in the antisubmarine service were the destroyers, and the most effective system of protection was the convoy. The first division (six boats) of American destroyers arrived at Queenstown on May 4, 1917, and, within the next 30 days, three similar divisions joined them. Not only did they greatly help to relieve the strain on the British forces, but news of their appearance on the blockade 28 days after the declaration of war was most inspiring to the Allies and more than equally depressing to the Germans. Before American troopships began to reach the danger zone in great numbers, many more American destroyers, together with patrol vessels, submarines, and cruisers, had joined the Allied forces, so that the rush of troops during the spring and summer of 1918 was so effectively guarded as to surprise not only the United States and its Allies but also the Germans, who had confidently expected to prevent absolutely the transport of any great number of troops and their supplies, and who were chagrined and alarmed by their complete failure. See NAVIES; BOMB, DEPTH; HYDROPHONE; PARAVANE; VESSEL, NAVAL, *Submarine;* WAR IN EUROPE, *Naval Operations;* BLOCKADE, ALLIED; WAR, DIPLOMACY OF THE.

SUBWAYS. See RAPID TRANSIT.

SUCROSE. See CHEMISTRY, ORGANIC.

SUDAN, ANGLO-EGYPTIAN. An African territory under the joint administration of Great Britain and Egypt, lying between Egypt and Uganda and the Belgian Congo, and extending from the Red Sea to the limits of Wadai in Central Africa. Area, 1,014 000 square miles; population, estimated in 1922, 5,850,000. The chief towns are· Khartum, the capital (30,600), Omdurman (78,000), Khartum North (34,000). Gum arabic continued the product of greatest economic value. In 1913, 33,353,393 pounds were exported (value, £E371,528); in 1923, 50,200,640 pounds were exported (value, £E1,006,223). Cotton ranked second with 5,103,750 pounds, valued at £E152,110, and 11,228,000, valued at £E458,188. Fluctuations were great, as may be seen by the 1915 output of 9,794,000 pounds and the 1921 output of 11,068,000 pounds. This was occasioned by the inability to regulate the water supply, a condition dependent on the completion of the great irrigation projects in the Tokar district of the Red Sea province. Other products included: durra (millet), with an estimated yield of 90,000 tons and an export of 43,900 tons (£E240,150) in 1922 and 37,351 tons (£E212,185) in 1923 as compared with an export of 2080 tons in 1913 and 85,000 tons in 1917; sesame (value of export in 1923, £E190,505); cattle (value of export in 1923, £E103,747); ivory (value of export in 1923, £E56,512 for 41 tons; the 1913 output was 138 tons). In 1913, total exports were £E1,185,186; in 1920, £E4,712,652; in 1923, £E2,562,091. Reexports for 1913, 1920, 1923, were £E93,055, £E363,319, £E190,334. Imports for 1913, 1920, 1923, were £E2,109,476, £E7,006,865, £E4,669,004. Imports, by order of value in 1923, included cotton fabrics, iron and steel manufactures, sugar, coal, machinery, flour, etc Exports were sent to the following in order of value in 1923: United Kingdom, Egypt, United States (£E305,218), Germany, Italy. Imports in 1923 were from Egypt, United Kingdom, India and Aden, Japan, Abyssinia, United States (£E95,208). The rapid development of cotton and cereal growing enhanced greatly the importance of Port Sudan.

It was seen by the Sudan government that only great irrigation projects could open up the country for economic exploitation. The two areas which received attention in the period 1912-23 were the Gezira district, between the White and Blue Niles, and the Tokar district in the Red Sea province. In the former a project was commenced in 1914 for the opening up of about 300,000 acres by the construction of a dam on the Blue Nile, at an estimated cost of about £6,000,000. At the same time, the Egyptian government proposed to construct a dam on the White Nile below Khartum, for the use of its own lands. Work was commenced on this scheme in 1919 but was discontinued for lack of funds in 1921. The work on the Makwar (Blue Nile) dam continued, by 1922, it had cost £4,000,000 In 1922, there were 1500 miles of railway in operation. In 1923, construction was under way on a railroad from Thamian to Kassala for the tapping of the great Tokar cotton district. To facilitate communications, the British erected 11 wireless stations in the Sudan. The cost of government consistently increased. For 1913 and 1922, revenues were £E1,568,352 and £E3,880,000; expenditures for the same years were £E1,533,065 and £E3,880,000. Surpluses from revenue were accumulated in a reserve and expended on public works.

The Sudan enjoyed the period of prosperity that was prevalent in all noncombatant countries during the War. The rise in prices, the demand for cotton and gum, and the presence of large British forces in Egypt, accounted for the economic well-being. This state of affairs was reflected in the comparative peace that attended the British occupation. In 1916, the confines of the territory were extended to take in the whole of Darfur, which was incorporated as the fifteenth province of the Sudan. This was occasioned by the rebellion of the Sultan Ali Dinar who, working with the insurgent Senussi, contemplated an invasion of the Sudan. As a result of the conquest, Great Britain and France were able to settle the troublesome frontier question of Wadai and Darfur (1919) During the period of the War, military forces were in continual operation in the southern provinces, notably Mongalla and Nuba, because of local uprisings. The Sudan was little affected by Egyptian troubles (1919–23) and though Egyptian nationalism sought to include the

Sudan in its aspirations, there was very little positive sympathy displayed by native Sudanese. The British government steadily refused to permit the new Egyptian state to absorb the Sudan (see EGYPT). In August, 1924, a crisis in Anglo-Egyptian relations was precipitated when Egyptian agitations led to outbreaks in Khartum, Boha, and Port Sudan. Planes and troops were rushed to the affected areas and for a time fears were entertained that the revolt might become general

SUEZ CANAL. During the War the Suez Canal became an important strategic and military consideration, and it was determined that its waterway should be deepened and enlarged so as to take care of greater vessels. By 1921, a depth of 39.4 feet, which was fixed as the minimum, obtained for the distance of 80.8 miles, leaving but 18.6 miles which was 34 feet deep. This shallow portion was toward the Suez end where there was a tide of 3.28 to 5.91 feet, so that at certain stages of the tide there was full depth through the canal, there being practically no tide at the Mediterranean end. The minimum width at the bottom was 147.6 feet, while the ordinary width of 197 to 246 feet was increased to 325–360 feet at curves or special places

Much of the canal bank was lined with stone to prevent washing, and this wall was set at the full standard width which later was obtained by dredging to give the projected cross-section of water at all points At Port Said the breakwater was extended to prevent much of the slipping up of the entrances. From 1921 on, there was practically 40 feet of water available for the entire length of the canal. Previous to the War the traffic through the canal was about 21,000,000 tons annually During the War it declined to 13,000,000 to 14,000,000 tons, and in 1923 it increased to 22,730,162 tons, as indicated in the accompanying table.

SUEZ CANAL TONNAGE AND RECEIPTS, 1913, 1919–1923

Year	Ships		Other vessels [a]		Total cargo, in metric tons	Total receipts, in francs
	Number	Net tons	Number	Net tons		
1913	5,085	20,034 000	..	..	25,776,000	127,303,000
1919	3,986	16 013,802	2,406	431,536	13,973,000	144,984,000
1920	4,009	17,574,657	3,133	230,594	17,047,000	151,868,000
1921	3,975	18,118,999	3,257	155,820	17,509,000	149,251 000
1922	4,345	20,743,245	3,044	94,009	21,361,000	166,857,000
1923	4,621	22,730,162	2,901	91,970	22,777,000	175,791,000

[a] Includes small craft and local traffic.

By 1923, traffic through the Suez Canal had surpassed all previous records, amounting, as stated, to 22,730,162 net tons, or an amount greater by 2,455,000 tons than the record of 1912, which, until 1922, had been the highest previous year's record. As will appear from the table, the increased tonnage corresponds with the decrease in the number of ships, the total for 1923 (4621) being 752 less than in 1912, but the average net tonnage per vessel rose from 3773 in 1912 to 4919 in 1923.

While there was a tonnage recovery of cargo movement through the canal after 1919, the totals were less than before the War. For example, the total southbound cargoes in 1923 amounted to 7,704,000 metric tons, as compared with 11,320,000 metric tons in 1913, while the northbound cargoes showed a slight increase, being 15,073,000 metric tons, as compared with 14,456,000 in 1913.

SUGAR. See CHEMISTRY, ORGANIC.

SULPHUR. Few discoveries in the field of chemical engineering were of greater significance than that of the Frasch process by which sulphur deposits of Louisiana and Texas could be exploited in an efficient and economical way. In 1900 the domestic output of sulphur in the United States was valued at only about $500,000, and the demands of the industry were met by imports of sulphur and pyrite, or by native supplies of the latter substance. In 1902, came the successful development of the new process, and by 1920 the output had grown to such an extent that it was valued at $30,000,000, and the three companies working in this field not only were able to supply the domestic demand but to export sulphur to the extent of about $9,000,000 Before the War, quantities of pyrite were produced in the United States and were used in the manufacture of sulphuric acid, but during the War sulphur was substituted by many manufacturers of sulphuric acid and the output of the plants was increased As a result, in 1920 the production of pyrite, which comes mainly from California and Virginia, with small imports from Spain and Canada, was the smallest since 1911. The amount of sulphur mined and shipped, together with its value in the interval from 1914 to 1924, is given in the accompanying table.

U. S. SULPHUR PRODUCTION

Year	Sulphur mined Long tons	Sulphur shipped Long tons	Value
1914	417,690	341,985	$6,214,000
1915	520,582	293,803	3,955,000
1916	649,683	766,835	12,247 000
1917	1,134,412	1,120,378	23,987,000
1918	1,353,525	1,266,709	27,868,000
1919	1 190,575	678,257	10,252 000
1920	1,255 249	1,517,625	30,000 000
1921	1,879,150	954,434	18,000,000
1922	1,830,942	1,343,624	24,000,000

The output in 1922 came from two mines in Texas, and from one each in Louisiana, Nevada, and Utah, more than 99.9 per cent being produced by the three mines in Texas and Louisiana which regularly contribute the bulk of the annual output of the United States. An agreement between the American and Sicilian sulphur producers regulating the world's unrefined sulphur market was concluded early in the spring of 1923. Prices were to be regulated in relation to the demands for consumption, with an intention of gradually regaining the pre-war levels based on a gold standard, and to be increased by $1 a ton over those temporarily put into effect in October, 1922. North America was to be supplied by the American producers, Italy by the Sicilian producers, and the remainder of the world proportionately by the two groups, with the provision that Sicilian producers might sell to any country a maximum of 65,000 tons for the manufacture of sulphuric acid. This agreement permitted Sicily to export annually 210,000 tons, including 65,000 tons for sulphuric acid, a quantity largely in excess of Sicilian exports in recent years.

The development of the American sulphur in-

dustry not only had peculiar significance in the United States but it was a very vital matter for Italy. In 1906, the Sicilian production was 475,553 metric tons, and with the development of the American mines it was realized that the Italian industry was seriously threatened by the United States, as Italy was the only serious competitor of that country.

The Sicilian production, together with that of all Italy, is indicated in the accompanying table.

Year	Sicilian Production	Total Italian Production
1914	334,974	377,843
1917	177,453	211,847
1918	194,585	234,296
1919	181,744	226,126
1920	224,247	263,603
1921	240,089	273,872
1922	137,640	191,600

SUMATRA. See DUTCH EAST INDIES.

SUMNER, FRANCIS BERTODY (1874–). An American zoölogist, born at Pomfret, Conn. He was educated at the University of Minnesota and at Columbia University. He was instructor at the College of the City of New York (1899–1906); director of the biological laboratory of the United States Bureau of Fisheries at Woods Hole (1903–13); as well as biologist at the Scripps Institute for Biological Research (1913–19); and associate professor of zoölogy (1919–) at the University of California. He published extensively on the development of the bony fishes, on the fauna of the Woods Hole region, and more recently on the influence of environment on, and heredity of, the coat color of various mammals.

SUN; SUN SPOTS. See ASTRONOMY; METEOROLOGY; PHYSICS

SUNDAY SCHOOL UNION, AMERICAN. A corporate organization, having annual and life members, established in 1817 as the Sunday and Adult School Union; seven years later its name was changed to that given above. Its object was to establish and maintain Sunday schools and to publish and circulate moral and religious publications. The affairs of the society were conducted by a board of officers and managers—prominent laymen of the different denominations. In the years between 1915 and 1924, 11,423 Sunday schools were established and 6782 were reorganized; over 200 missionaries were commissioned yearly; 68,385 Bibles, 165,156 New Testaments, and 103,491 Gospels of John were distributed; 497 churches were organized, 193 churches built; 3039 prayer meetings established, and over 1000 young people's societies organized. In carrying on their work the missionaries made 1,942,747 visits to families, traveled 11,957,141 miles, delivered 213,434 sermons and addresses, and reported professed conversions of 64,218 persons. The work of the Union was chiefly in the rural districts of the country, in places where there were no religious services. It was to these otherwise unreached communities its missionaries carried the Gospel message and started a religious work. Work among the Negroes of the South was also undertaken. The society published books of reference, Bible dictionaries, maps, and other helps to the study of the Bible, many of which were used as textbooks in theological seminaries and colleges. It published 11 periodicals and lesson helps for Sunday school teachers and scholars—evangelical and undenominational in character—of which over 19,000,000 copies were distributed between 1914 and 1924. National headquarters were maintained at Philadelphia. President, Martin Luther Finckel.

SUN YAT-SEN (1867–). A Chinese revolutionary leader, born in Kuangtung province, the son of a native Christian. He was educated at the College of Medicine in Hongkong and practiced his profession in Macao and Canton. Believing that the Manchus were responsible for Japan's aggressions in China, he headed a revolt against the government in 1895, but failing in his purpose, he was obliged to leave the country. He collected funds from the United States, Hawaii, and the Straits Settlements to help the antidynastic movement and also organized propaganda work in China. In Japan he founded a society called the Tung Men-hui, which later played an important part in Chinese politics The "western learning" section of young China looked on him as their leader. When the revolution broke out prematurely at Wuchang, he was in England, but he returned to China in time to be elected provisional president When on Feb. 12, 1912, the Emperor abdicated, Yuan Shih-K'ai was made head of the new government, Dr. Sun resigning the presidency. Later Dr. Sun was appointed director of national railways at Shanghai. When Yuan died in 1916, Dr Sun headed a group of Cantonese who fought against the party in power at Canton, and in 1921 he was elected president of the Chinese Republic, although the southern part of the country would not recognize his authority. A prolonged struggle between the sections ensued, during which his prestige throughout the world decreased, while his power in China remained indeterminable.

SUPERCHARGERS. See INTERNAL-COMBUSTION ENGINES.

SUPERHETERODYNE. See RADIO TELEPHONY

SUPERPOWER TRANSMISSION SYSTEM. See ELECTRIC POWER TRANSMISSION AND DISTRIBUTION.

SUPREME COUNCIL. See PEACE CONFERENCE AND TREATIES

SUPREME COURT, UNITED STATES. See LAW, PROGRESS OF THE; LABOR LEGISLATION, *Supreme Court Decisions*; UNITED STATES, *History*; TRUSTS

SURFACE, FRANK MACY (1882–). An American zoölogist and statistician, born at Eaton, Ohio. He was educated at the State University of Ohio (A.M., 1905) and at the University of Pennsylvania (Ph.D., 1907). He was associate biologist at the Maine State Experiment Station (1907–10 and 1913–17); biologist at the Kentucky Experiment Station (1910–13); assistant chief statistician of the Division of Food Inquiry (1917–19), and chief statistician of the American Relief Administration (1919–20).

SURGERY. See ABORTION; ANÆMIA; ANGINA PECTORIS; CANCER; GALLSTONE DISEASE; WOUNDS

SURGERY, RECONSTRUCTIVE. As a result of the War, there was a certain amount of reversion to first principles in postbellum surgery. Whether such reversion has been beneficial is another matter. Surgery in 1924 might be an improvement in some ways over surgery in 1914, but was such improvement due necessarily to military experiences? There were still thousands of crippled children and adults due large-

ly to lack of organization and equipment, special hospitals and vocational training schools. It should be possible after ordinary traumatism and infantile paralysis—to go no further—in the interest of salvage, to save 10 per cent of the victims if the requisite apparatus could be guaranteed. As a result of war experience we know that proper first aid often prevents crippling. One of the chief lessons from the War has to do with splints and splinting, the latter requiring team work among the surgeons. In all locations in which accidents have a cumulative incidence, splints are now kept on hand in sufficient amount while attempts at standardization of splints and splinting have been patterned successfully upon military surgery. In routine surgery, splints are adjusted with the principal object of prevention of deformity yet this must at times antagonize the principle of wound treatment.

The Carrel-Dakin solution which proved of such value in war wounds, as well as the other methods in vogue for wound treatment, are naturally antagonistic to the principle of fixed dressings intended to avert deformity; and until the two forms of treatment can be brought in harmony with each other the status of wound treatment will be unsatisfactory. Some form of compromise must be forthcoming; permanent splinting must not be allowed to interfere with wound drainage. Stiffness of joints after immobilization will not be due to the treatment but to the original injury. The extremely radical methods of cleansing infected war wounds are not required in peace surgery and would be unnecessarily drastic.

SUTHERLAND, GEORGE (1862–) An American jurist and legislator (see VOL. XXI). He served as United States Senator from 1905 to 1917, but was defeated for reelection in 1916. He was appointed to the United States Supreme Court in 1922

SUTTON, SIR J. BLAND-. See BLAND-SUTTON, SIR JOHN.

SUVLA BAY. See WAR IN EUROPE, *Turkish Front.*

SUWALKI ZONE. See VILNA.

SWARTHMORE COLLEGE. A nonsectarian, coeducational institution at Swarthmore, Pa., founded in 1864. The student enrollment increased 25 per cent during the decade between 1914 and 1923–24, from 434 to 537 students. The board of managers voted to limit attendance to approximately 500 students. To the college library of 57,000 volumes there was added the Friends' Historical Library The Sproul Astronomical Observatory was completed in 1915 and two swimming pools were added to the gymnasium, and in 1920 Hicks Hall of Engineering was built. The Cloisters, a group of six fraternity and nonfraternity club houses, was under construction in 1923–24, and Worth Dormitory for girls was completed in the same year. A million dollar endowment campaign was completed in 1921, bringing the productive funds of the college to more than $3,000,000. Joseph Swain, LL.D., resigned from the presidency in 1920 and was succeeded in 1921 by Dr. Frank Aydelotte.

SWAZILAND. A British native protectorate in South Africa under the control of the British Colonial Office and administered by a resident commissioner under the direction of the high commissioner for South Africa. It has an area of 6678 square miles and a population of 112,951, of which 2205 were Europeans, by the census of 1921. The main concern of the administration was the expropriation of monopolies and concessions which had been granted to whites by the Swazi chief, Mbandeni. During 1904–22, £117,412 was spent on this work. The public debt still amounted to £92,500. Swazis were settled on land reserves which amounted to about one-third of the total acreage in the protectorate. The costs of administration increased from £63,967 in 1913–14 to £89,674 in 1922. Native taxes, customs, sales, leases, concession rents, and licenses furnished the revenues. The people were largely a pastoral folk and exported oxen and hides to the Cape. Live stock in 1921 numbered: cattle, 210,391; horses, 1449; and goats, 118,790. Recent experiments with tobacco and cotton by white farmers were meeting with success. Tin mining was important, the yield in 1915–21 being worth £376,000. Gold was fast declining, the yield in 1922 being only 427 ounces.

SWEDEN. A kingdom in northern Europe with an area of 410,581 square kilometers. Its population (1922 and 1913) was 5,987,520 and 5,638,583, of which the urban population comprised 1,813,177 and 1,485,840 The chief cities and their population were (1922 and 1912): Stockholm, 424,944 and 350,955; Gothenburg, 228,258 and 173,875; Malmø, 144,796 and 92,338; Norrkøping, 58,353 and 146,674; and Helsingborg, 48,390 and 33,863.

Agriculture. Total area of agricultural land under cultivation (1921) was 3,794,711 hectares; natural meadow, 922,824 hectares; forest areas, 24,583,721 hectares The area and production of various crops was as follows:

	Hectares 1913	Metric tons 1913	1923
Wheat	146,712	254,000	317,000
Rye	351,824	566,000	644,000
Barley	165,836	368,000	255,000
Oats	728,639	1 449,000	969,000
Mixed grains	265,169	381,000	430,000
Leguminous crops	46 785	54 000	61,000
Potatoes	158 658	2,051,000	1,667,000
Root crops	135,757	3,127,000	4,060,000
Hay	1,682,304	4 472,000	4,750,000
Total value of 1923 crops (kronor).		1,116,000,000	crowns
Total value of 1913 crops		887,700,000	crowns

Sweden imported heavily of grain and flour, imports during 1923 amounting to 108,755,000 crowns (1913, 54,692,000) as against exports of 6,515,000 crowns (1913, 3,987,000). Sweden's chief exports were lumber, wood pulp, paper, and iron ore.

Mining and Industry. In 1922, there were 1757 lumber mills (1248 in 1912) employing 50,217 workers (37,908 in 1912). Wood-pulp production (1922): mechanical, 581,700 metric tons, chemical 1,158,553 tons. The coal supply was very small and insufficient for the requirements, production during 1922 being 378,861 metric tons. Sweden was, however, very highly developed electrically, utilizing its waterfalls for the production of motive power. Sweden disposed of approximately 1,150,000 developed turbine horse power. Figures for the iron and steel industry were as follows: (1922) iron mines, concentrating, and briquetting works, 98; workmen, 8348; production of iron ore, 6,201,244 metric tons; number of iron and steel smelting furnaces, 453; production of pig iron, (1922) 264,259 metric tons, (1923) 277,000 tons.

Transportation and Communication. The length of railways was 15,401 kilometers in 1922 and 14,171 in 1912, of which for the former, 5625 kilometers were state owned (4610 in 1912). Traffic (1923) on state railways: passengers carried, 25,282,000; freight, 13,149,000 metric tons. Similarly for private railways: passengers carried, 38,300,000; freight hauled, approximately 19,000,000 metric tons. On Dec. 31, 1923, Sweden's merchant marine totaled 1,220,077 gross tons (ships over 100 gross tons only), of which the 1181 steamers and motorships weighed 1,152,912 gross tons, and the 238 sailing vessels 67,165 gross tons. Total earnings of merchant marine (1922) reached 185,400,000 Kr. Vessels entered (1921) with cargoes were 17,431, with net tonnage of 6,443,157 tons; while in ballast 6790 vessels with net tonnage of 1,879,416 entered. Vessels cleared with cargoes numbered 10,334 with a net tonnage 6,676,802 tons; in ballast 7778, with net tonnage of 1,612,375. In 1922, the length of telegraph wires was 80,000 kilometers; the number of stations 3480; the number of messages, 7,001,472. Length of telephone wires: state, 679,452 kilometers; private, 10,625 kilometers.

Commerce. Swedish exports (1923 and 1913) were valued at 1,136,000,000 and 817,347,000 crowns; imports, 1,342,000,000 and 846,538,000 crowns. Exports and imports, by groups of commodities, for 1913 and 1923 are shown in the table.

IMPORTS AND EXPORTS, BY GROUPS OF COMMODITIES

	1923		1913	
	Imports	Exports	Imports	Exports
Textile manufactures	140,749,000	16,661,000	62,062,000	5,692,000
Spinning raw materials	87,395,000	2,724,000	60,138,000	2,374,000
Tallow, oils, tar, rubber, etc.	80,058,000	10,085,000	67,061,000	5,404,000
Minerals, raw, etc	181,562,000	92,819,000	148,847,000	91,142,000
Metals, unfinished	64,237,000	62,167,000	48,796,000	78,623,000
Metals, wrought	57,105,000	45,059,000	40,845,000	29,543,000
Vessels, autos, carriages, machinery	117,250,000	114,053,000	51,267,000	62,966,000
Grains, flour, etc	108,755,000	6,515,000	65,290,000	11,031,000
Timber products, sawn, etc	8,141,000	276,551,000	15,355,000	247,883,000
Pulp, cardboard, paper, etc.	15,365,000	311,609,000	4,919,000	112,784,000
Animal foodstuffs	48,275,000	45,595,000	28,827,000	73,152,000
Groceries	97,432,000	659,000	60,086,000	686,000

CHIEF COUNTRIES OF ORIGIN AND DESTINATION, 1922

	Imports Crowns	Exports Crowns
Germany	314,100,000	103,220,000
Great Britain and Ireland	268,310,000	284,970,000
United States	167,370,000	137,990,000
Denmark	84,620,000	83,380,000
France	32,370,000	104,930,000
Norway	35,270,000	80,050,000
Netherlands	39,120,000	55,070,000
Russia	3,560,000	68,180,000

Finance. On Dec. 31, 1923, the state debt stood at 1,643,055,870 crowns of which 1,596,949,617 were funded. Notes in circulation totaled 559,000,000; gold reserve, 271,800,000 crowns. The budget proposal for 1924–25 provided for total income of 644,429,500 crowns of which actual state revenue amounted to 492,496,500. Paper currency outstanding Mar. 1, 1924, 530,000,000 crowns. The exchange rate was generally around par during the period (26.8 cents). The cost of living, which, in July, 1920, reached 270 (as based on the 1914 prices at 100), dropped to 236 in July, 1921, and 195 in April, 1922.

History. The outbreak of the War occasioned an immediate declaration of neutrality by Sweden, in company with the other Scandinavian countries, and in this she persisted to the end. Her position was a difficult one, and the Swedish people displayed extraordinarily good sense in circumventing the vexing problems which arose. In the beginning of the War, it appeared that Sweden's economic stability would be little deranged, for she at once became the go-between for Germany and America. For a time this trade flourished, but as the submarine campaign intensified and the British blockade became tighter, Sweden began to feel the pinch of necessity. From 1916 on, coal imports from Great Britain began to drop off seriously. The blockade was thrown, not about Germany, but about the Scandinavian countries, for there were no means of ascertaining whether imports to Sweden were not designed for transshipment to the Central Powers. The result was that the suffering of the population was often acute. Measures had to be taken for the regulation of industry and conservation of what little food and raw material stocks Sweden had or was able to get. All exports were closely scrutinized and those of the more important domestic products prohibited; a financial moratorium was imposed; the government was empowered to fix prices, hold up the sale of shipping, take in hand the whole matter of insurance, and resort to rationing. On this last score the life of the greater part of the population was, of course, intimately touched. A food commission was set up to supervise the importation of foodstuffs and in 1915 price-fixing was resorted to. In 1916 and 1917, sugar cards and bread cards were first employed, the bread allowance being generally 250 grammes per person per day. Other articles rationed were potatoes, milk, and coffee. All such regulations were finally lifted in August, 1919. Industry likewise suffered. In the activities dependent on the use of foreign raw materials, it was necessary to form import associations for the distribution of stocks. Before the end of the War, rationing was the rule in almost every industry. In the matter of fuel, for which Sweden depended on outside sources, the people were hard hit. It was necessary, therefore, to create a fuel commission, which undertook the exploitation of the country's forests on a grand scale. Mines and railways were kept going, but because prices charged were less than the cost of cutting, the government had to assume a deficit of 100,000,000 crowns.

Sentiment regarding the War at first gravitated toward the Central Powers. The rigors of the British blockade had seriously interfered with the course of Swedish life, perhaps more profoundly than with those of the other Scandinavian peoples, and the Swedes adopted a more bellicose attitude toward the Entente. In 1916, debate in the Riksdag was very bitter,

the Russian decision to fortify the Aland Islands particularly giving offense. Under the prompting of the military or Activist party, the Riksdag passed a military appropriation of 104,000,000 crowns. But from 1917 on, the general attitude changed. A cabinet crisis on Mar. 5, 1917, precipitated the fall of the Hammarskjöld ministry, and the succeeding cabinets concerned themselves more and more with the problem of reaching an agreement with the Entente The question became more pressing as food became scarcer and rioting more frequent. Throughout 1917, pillaging of bakeshops was the rule Finally, in February and in June, 1918, understandings were effected with Great Britain whereby Sweden was permitted to import stocks of food and such raw materials as phosphates, oils, coal, cotton, wool, rubber. In return Sweden turned over part of her merchant marine to the Entente and guaranteed the export of her iron ores.

The unsettled economic conditions and the spread of democratic doctrines immediately after the War left their mark on the progress of Swedish events in the years 1919–24 By laws in 1919 and 1921, the Riksdag made the right of suffrage universal, women being given the franchise on May 26, 1919 In 1921, a national referendum law was passed. A question of greatest national interest was the discussion over the legalization of the eight-hour day in 1919. After a prolonged debate, the measure was defeated in the Riksdag with the result that the Chamber was dissolved and a new election held. The new chamber proved more amenable to the government's wishes and the law for an eight-hour day was carried. The prevalence of radical ideas was further indicated when the King was compelled to summon Herr Branting, leader of the Social Democrats, to form a government in 1920. An ambitious programme for the inauguration of inquiries into socialization of industry, expropriation of large estates, disestablishment of the State Church, and disarmament, was announced, but the government went down to defeat in the autumn elections, as a result of heavy polls for the Right, and was compelled to resign. No temporary expedients or brave gestures could act as stop-gaps. The depression of 1920-21 which gripped the world was felt in Sweden, too, for in the general stagnation about 150,000 men were out of work at the end of 1921. Politics again became the barometer. In the elections of 1921, the Social Democrats were heavily supported, with the result that Herr Branting formed a Socialist government for the second time The Branting ministry continued in power until Apr. 6, 1923, when it fell on the question of unemployment doles. It had maintained its position of course only on sufferance, representing merely a minority party. The continued disorganization of industry had manifested itself in a growing turbulence, so that 1922–23 saw the country gripped by strikes in the sawmills, wood-pulp factories, and iron works. In the face of such internal storms, and lacking the power to force through remedial measures, the Branting ministry went down and was followed by a Right government headed by Herr Trygger

In foreign affairs, Sweden's rôle was a more complex one than that of the other Scandinavian countries, for her proximity to Finland and Russia involved her in questions of importance. The establishment of the republic of Finland in 1917 divided Swedish counsels. There was a large body of opinion favorable to an immediate recognition; another group, concerned over the disposition of the Aland Islands, was in favor of a more circumspect policy. In 1918, Finland was recognized, though Sweden refused to take sides in the internecine war between the Reds and the Whites which broke out in that year. The Aland Islands question continued to agitate political circles, though, in 1920, Sweden decided to submit the whole matter to the League of Nations, which it had joined that year, the grant of the islands to Finland in May, 1921, was received with much disfavor (see ÅLAND ISLANDS). While Russia did not receive formal recognition, a commercial delegate was permitted to establish his residence in Sweden, and though in 1919 the unpopularity of the Bolsheviks forced his departure, commercial relations were once more resumed in 1920. To the credit of Sweden was the government's refusal to join in the Allied blockade of Russia in 1919 In May, 1924, *de jure* recognition was accorded Russia. Subsequent European events were viewed with hostility rather than the usual indifference. Protests were frequent against the Ruhr occupation for in this fact lay the explanation of the disorganization of the Swedish iron industry and the adverse trade balance of 1923. Herr Trygger expressed the Swedish temper in the spring of 1924 when he declared a lack of confidence in the League of Nations' ability to guarantee international justice and peace. His government's concern with an increased defense budget and a scheme for longer military service as well as for the creation of an independent air-force board was of a piece with the prevailing uneasiness. See SCANDINAVIAN LITERATURE: NAVIES OF THE WORLD; ÅLAND ISLANDS; EXPLORATION

SWEDENBORGIANS. See NEW JERUSALEM, CHURCH OF THE

SWEDISH LITERATURE. See SCANDINAVIAN LITERATURE.

SWEET BRIAR COLLEGE. A college for women founded at Sweet Briar, Va., in 1906. The number of college students increased from 74 in 1914 to 373 in 1924, and the faculty members from 20 to 32. The academy was discontinued during the period. The library increased from 4100 to 10,450 volumes during the decade, and the annual income from $125,957 to $224,726. An endowment of $302,110 was raised by the college. Emelie Watts McVea, Litt D., LL D., succeeded Mary K Benedict, Ph.D., as president.

SWIMMING. See SPORTS

SWINNERTON, FRANK ARTHUR (1884–). An English novelist and critic, born at Wood Green. His writings include: *The Merry Heart* (1909); *The Young Idea* (1910); *The Casement* (1911); *The Happy Family* (1912); *George Gissing: A Critical Study* (1912); *On the Staircase* (1914); *R L. Stevenson: A Critical Study* (1914); *The Chaste Wife* (1916); *Nocturne* (1917); *Shops and Houses* (1918); *September* (1919); *Coquette* (1921); *The Three Lovers* (1922); *Young Felix* (1923).

SWITZERLAND. A country of south central Europe. Its area is 15,945 square miles, of which 507 square miles are lakes of more than 25 acres in area, and 3072 square miles

otherwise unproductive. Of the productive land, 3576 square miles were forests in 1921, 69 square miles in vines, and 8721 square miles in agriculture and mountain pasturage. According to the 1920 census, the population was 3,886,090, compared with 3,765,123 in 1910. The largest cities were Zurich, 207,161, Basel, 135,976, Geneva, 135,059, Berne, 104,626, and St. Gall, 70,437. The population of Zurich was declining; for 1921 was estimated at only 203,840, reacting from an abnormal increase during the War; the population of the other cities did not change materially. The percentages of the population engaged in various pursuits in 1910 (statistics for 1920 not yet published) were as follows: extraction and production of raw materials, 28 per cent (of which 96 per cent was agricultural); industries, arts and trades, 43 per cent; commerce, 10 per cent; transportation, 6 per cent; domestic service, 1 per cent; living on income or on another's bounty, 3 per cent; without profession, in foreign families or establishments, 3 per cent. In 1910, the number of German-speaking persons in Switzerland was 2,594,184; French-speaking, 793,264; Italian-speaking, 302,578; Romansch-speaking, 40,234; and speaking other languages, 23,031. In 1913, emigration for overseas countries was 5787, considerably less than in 1920 and 1921, when those kept in by the War migrated in great numbers, the minimum of 304 having been reached in 1918. The 1922 figure (6191) represented a practical return to prewar conditions. Switzerland is largely a Protestant country, although in certain cantons, especially St. Gall, Lucerne, Fribourg, Tessin and Valois, Catholics are considerably in the majority. There is, however, no Federal church, all denominations being supported by voluntary contributions, not by state taxes. In 1910, there were 2,107,814 Protestants, 1,593,538 Catholics, and 18,462 Jews.

Education. In the school year 1921–22 there were 646 kindergartens, with 831 teachers and 19,380 pupils; 4253 primary schools, with 16,829 teachers and 531,009 pupils; 524 secondary schools, with 2623 teachers and 54,604 pupils; and 156 intermediate schools, with 1880 teachers and 27,280 pupils. There were also supplementary professional, industrial, commercial, agricultural, and domestic science schools, numbering 1069 with 72,875 students and 4713 teachers. The higher professional schools (including also normal and arts and crafts schools) numbered 48, with over 32,000 students The seven Swiss universities were located at Basel, Zurich, Berne, Geneva, Lausanne, Fribourg and Neuchâtel, with 5879 students and 1134 hearers At Lucerne was a theological faculty with 45 students, and at St. Gall a commercial academy with 390 students and hearers.

Agriculture. Agricultural production in Switzerland was as follows: wheat (including spelt and meslin), 154,020 metric tons in 1913 and 148,403 metric tons in 1923; rye, 45,054 and 41,799 metric tons; barley, 9936 and 22,401 metric tons; oats, 75,324 and 44,403 metric tons; corn, 2976 and 4200 metric tons; potatoes, 725,000 and 634,000 metric tons. Beef cattle in 1911 numbered 1,443,483, of which 796,909 were cows; after reaching a low point of 1,382,116 cattle, of which 729,999 were cows, in 1920, the number increased to 1,425,341 and 747,138 respectively in 1921, the latest available year. Horses numbered 144,128 in 1911 and 134,147 in 1921.

Industry. Switzerland is an industrial country in spite of a lack of raw materials; the chief natural resource is water power. The total water power available was estimated at 2,699,336 horse power in 1914, of which 526,098, or 19.5 per cent was already utilized; water power was used principally by hydro-electric stations and by the chemical and textile industries. At the end of 1913 there were 8101 factories in operation in Switzerland, but no figure for the number of workmen was available; in 1916 there were 8433 factories with 360,506 workmen; and in 1922, 8055 factories with 304,339 workmen. The principal industries in 1922 were machinery and appliances, with 49,918 workmen; cotton textiles, with 32,265; clothing and outfitting, with 31,391; silk textiles, with 27,500; watch and jewelry manufacture, with 27,496; metallurgy, with 23,314; and foodstuffs and beverages, with 21,401. After the War many of the strongest industries, especially the machine industry, were greatly injured by competition with countries having depreciating currencies, and by the high cost of raw materials. The watch industry, however, was best able to meet competition and was, in 1924, in a flourishing condition. Unemployment, which was not a notable problem before the War, became very high in 1921, and reached a maximum in February, 1922, with 146,302 wholly or partly unemployed. A gradual improvement occurred to 35,314 in July, 1923, with a slight seasonal reaction to 39,673 at the end of December, 1923.

Commerce. Swiss foreign trade has suffered greatly from the War. In 1913 imports totaled 1,920,000,000 francs and exports 1,376,000,000 francs. In 1922, despite greatly increased prices, values were only 1,914,000,000 francs and 1,689,000,000 francs, respectively, and in 1923 they were 2,224,000,000 francs and 1,716,000,000 francs, respectively. The principal countries of source for imports and of destination for exports, with values for 1913 and 1923 were as follows:

	Exports to (values in thousands of francs)		Imports from (values in thousands of francs)	
	1913	1923	1913	1923
Germany ...	305,660	123,443	630,870	416,935
France	141,250	214,192	348,985	394,957
Italy . .	89,153	100,783	207,025	231,915
Great Britain	236,165	363,385	112,666	181,991
United States	136,432	209,485	117,898	177,856

The principal classes of commodities imported in 1923 (in millions of francs) were as follows: cereals, 243; cotton, 207; minerals, 194; silk, 185; wool, 144; colonial products, 124; animal foodstuffs, 116. The leading exports with values expressed in like manner were as follows: silk, 359; cotton, 306; watches and clocks, 203; machinery, etc., 151; animal foodstuffs, 103.

Finance. Budget deficits were not common and never large in Switzerland before the War. In 1913, expenditures were 192,000,000 francs and receipts 187,000,000 with a deficit of 5,000,000 francs. By 1921 expenditures had risen to 508,000,000 francs and receipts to 381,000,000 francs, with a deficit of 127,000,000 francs. Unemployment subsidies and subventions to depressed industries, added to expenses arising from maintaining armed neutrality in the War, contributed to this deficit. Subsidies were gradually reduced, so that for 1923 the deficit

dropped to 46,000,000 francs, and the budget deficit for 1924 to 37,700,000 francs. The public debt of Switzerland on Dec. 31, 1913, amounted to 148,270,000 francs; by the end of 1921 it had increased to 2,063,360,800 francs, and by the end of 1923 to 2,276,000,000 francs. In addition, there was the debt of the Federal railways, which amounted to 1,483,025,684 francs in 1913, to 2,188,676,084 francs in 1921, and to 2,388,500,000 francs in 1923. It was expected that the budget deficits would be eliminated within a few years, but the large amount of the public debt contracted after the beginning of the War created a heavy burden for the Swiss taxpayer.

Communications. Water connections between Switzerland and other countries were unimportant, except by the Rhine from Basel, and internal waterways were not suitable for through navigation. Swiss railways were, therefore, of great importance to the country. At the end of 1921, Swiss state railways had a length of 3588 miles, including 31 miles of funiculars, 296 miles of tramways, and 908 miles of narrow-gauge line. In 1910, the total length was 3147 miles; most of the construction occurred between 1910 and 1915. In 1913, the number of passengers carried was 91,649,336; in 1922, 81,-032,550; and in 1923, 86,883,670. In 1913, the amount of merchandise, baggage, animals, and postal packages carried was 14,614,781 metric tons; in 1922, 13,245,115 tons; and in 1923, 14,652,370 tons. In 1913, receipts reached 212,-721,315 francs and operating expenses 142,405,-716 francs; in 1922 receipts were 344,215,450 and operating expenses 313,712,867 francs; and in 1923, respectively, 365,437,524 francs and 251,880,593 francs. In 1913 there was a surplus, after paying charges on the railway debt, of 1,613,357 francs in the profit and loss account; in every succeeding year through 1922 there was a deficit, amounting to 45,513,680 for 1922; but in 1923, a small net profit was again recorded. Prospects for 1924 appeared favorable.

History. Switzerland's position, during the War, was perhaps more difficult than that of any other neutral. Without a merchant marine and hemmed in on all sides by belligerents, her political and economic situation could hardly be said to be of her own ordering. In the Swiss mind, there were two spectres ever present in the period 1914–18: the fate of Belgium and the danger of a very real starvation. The first hastened a general mobilization of all available man power (about one-tenth of the population), immediately on the declaration of war. But the continuation of hostilities and the lessening of the fear of invasion, together with the added financial burden that the upkeep of the military establishment imposed, began gradually to provoke dissent with the result that the government was compelled from time to time to demobilize detachments of troops. Distress among soliders' families occasioned governmental measures for relief beginning with 1917, while private agencies contributed unstintingly to the same end. In 1918, too, the pay of the soldiers was increased. Conditions were made tolerable for the men under arms by the activities of the Swiss Red Cross which was greatly aided in its work by a grant of almost $100,000 from the American Red Cross. In all, the War cost Switzerland, in the defense of her frontiers, some $200,000,000. Money was raised by loans, by increased duties, by war profits, taxes, and special levies. It was not until late in 1920 that troops were definitely withdrawn from the frontiers and the regular channels of communication once more thrown open generally.

Economically, the plight of Switzerland was equally wretched. Her most important export was milk and its products, which the Central Powers purchased in large quantities. On the other hand, Switzerland depended on Great Britain for her foodstuffs, and on Germany for coal, oil, raw materials, etc. To find a via media between the groups of belligerents was the most difficult question before the Swiss government. In 1915, wheat was created a state monopoly; rice, in 1916, was treated similarly. In taking measures of this kind Switzerland endeavored to comply with the Entente's injunction that imports be prevented from finding their way into Germany and Austria. On the other hand, the source of vital raw materials was in Germany, and to refuse to trade with the Central Powers or to fail to send stocks stored in Switzerland for them meant a death blow at the economic life of the little country in the cessation of coal, iron, manure, and sugar exports from Germany and Austria-Hungary. The diplomatic story of Switzerland during 1916–18 is a recital of rebuffs and recriminations. With the continuance of the War the pinch of necessity was felt more and more acutely. In 1917, Germany's unlimited submarine policy affected Switzerland keenly; the dearth of meatstuffs compelled the ordering of two meatless days. In the same year, Argentina's wheat stocks were retained in that country by an executive order so that a bread ration had to be resorted to. Because of the heavy exports of cattle it was necessary to ration the milk supply in 1917 and create a federal bureau for its distribution. Ultimately almost all other necessities of life fell under the control of the central authorities to be rationed out with a greater or less parsimony. These included sugar, oatmeal, barley, macaroni, cheese, butter, fat, oils, potatoes, and coal. There was no lack of prosperity for certain classes, however. In 1916, profiteering flourished in the necessities of life and was not checked until the government perfected its schemes of food-control. Certain industries, notably those whose factories could be converted for the manufacture of munitions, manifested a great activity, serving both belligerents with equal impartiality. The precarious economic situation led to a disturbing occurrence in 1918. The continuous rise of prices, the unrest among the soldiers and the dearth of the common necessities, together with the example of the Russian Revolution, brought on a general strike in Switzerland on Nov. 12, 1918, which soon had the whole country in its grip. The programme put forth by the Social Democratic leaders of the movement contained all the familiar slogans of radical social democracy: proportional representation, full suffrage for women, democratic reorganization of the army, a state-imposed 48-hour week, state social insurance, etc. The strike failed with the refusal of the soldiers to join, and the leaders were turned over to the military tribunals for trial. Sentences, however, were light. Another wave of radical and socialist agitation swept over the country in 1922, when a Socialist proposal for a graduated

and practically confiscatory capital levy was submitted to popular referendum. Some such measure seemed necessary, to its proponents, to meet the cumulating debt which war and postbellum conditions had occasioned; moreover, more than nine out of ten voters could feel that the levy would not touch them directly; nevertheless antisocialist arguments prevailed, and after an almost uniquely intense prereferendum campaign the voters on Dec. 3, 1922, rejected the capital levy by 704,785 to 101,057.

There was no brighter page in European history during this tumultuous period than the record of the Swiss conduct toward foreign nationals, voluntarily or involuntarily detained within Switzerland's borders. The great numbers of tourists caught within the country at the outbreak of the War had to be provided for until transportation facilities were available for their departure home. Upon Switzerland fell the onerous burden of making arrangements for interned soldiers. Before the end of the War at least 25,000 men of nations at war were being housed, fed, schooled, and set to work by Swiss authorities. The charge to the nations involved was surprisingly small, the fee for upkeep demanded being only 5 francs a day per head. To the Swiss Red Cross fell the work of exchanging prisoners. As a result of its arrangements, exchange dépôts were established at Constance and Lyons for the repatriation of German, Belgian, and French prisoners, and at Como-Monza and Feldkirch-Dornborn for the repatriation of Italians and Austrians. The work done in the care of the wounded was particularly commendable. The total of men thus provided for must have run almost to 100,000.

Switzerland, similarly, became more than ever a centre of international activity during the War. The International Red Cross at Geneva exerted itself in the propagation of the humanitarian ideas which before had received general acceptance, but which only too generally were disregarded by all the belligerents. It tried to facilitate communications among the nations at war, provide for prisoners, check the bombarding and torpedoing of hospital stations and ships, and the like. In 1915, an international congress of Socialist women was held at Berne; at Zimmerwald, later in the year, Italian, Rumanian, Bulgarian, German, French, Swedish, Norwegian, Swiss, Polish, Dutch, and Russian Left Socialists met for a general condemnation of the War. British Socialists were denied passports to the conference by their government. It is interesting to note that Lenine was one of the representatives of the Russian group. A reunion of these representatives was held at Kienthal, Apr. 24–30, 1916, where 40 delegates, consisting mainly of Italian, Swiss, and Russian Socialists, attended. There were, besides, two Germans and three Frenchmen. Switzerland, in 1918 and later, became the seat of activities for the reconstruction of the Socialist International. For accounts of these meetings, see SOCIALISM. In September, 1919, the International Council of Peace met at Berne. In 1920, the first meeting of the League of Nations was held at Geneva. In this connection it should be recorded that on May 15–16, 1920, by a vote of 400,000 against 300,000 the Swiss people voted to join the League of Nations. The German-speaking cantons voted, by a majority of 10,000, against participation. Only once did Switzerland forget those rules of hospitality which her people had so painstakingly helped to formulate and in whose application they had so distinguished themselves. In May, 1923, M. Vorovsky, the official Russian representative at the Lausanne Conference, was shot down and killed by a fanatic who subsequently was released after a sensational trial which turned about an examination and pillorying of Sovietism rather than the nature of the actual offense. The Russian government justly characterized the murder and the proceedings that followed as the work of a studied official remissness and in retaliation broke off commercial relations with Switzerland, employing the only effective device at its command, the economic boycott.

Switzerland's rôle in international affairs, after the War, took on important proportions Her continual protests against her dependence upon her neighbors for the maintenance of communications with the outside world were finally heeded by the Peace Conference in 1919, for Switzerland was given freedom of access to the sea via the Rhine. A topic for much discussion after the War was the agitation on the part of the German Austrians in the Vorarlberg province to gain admittance into the Swiss union. The inhabitants of the Vorarlberg were prompted largely by the desire to escape the onerous burdens of the Treaty of St. Germain, and it was largely on account of the question of reparations that the Swiss opposed the step, though many Swiss also objected to the addition of 15,000 more German-speaking people to the already heavy German majority. In 1921, the Swiss Federal Council consented to the incorporation of the little principality of Liechtenstein (q.v.) into the Swiss Customs Union. Diplomatic and consular representation as well as the management of posts and telegraphs were also turned over to the Swiss. Another result of the War for Switzerland seemed the settlement of the long-standing dispute with Italy over the Ticino district. Italy's ambitions in the Tirol had been so well satisfied that it was likely the claim would not be raised again. In the west, however, matters were not so happily concluded. A dispute with France, which since 1921 had bobbed to the surface at intervals, completely emerged in 1923 to become a matter of prime importance. On Nov. 10, 1923, after protracted negotiations, the French government advanced the French customs line to the Swiss frontier and thus eliminated the free zone of Upper Savoy which had existed since 1815. This action had been prescribed by the Treaty of Versailles and had received the approval of the Swiss government, but the Franco-Swiss Convention sealing it was defeated in a Swiss referendum in February, 1923. During the year no one settlement was acceptable to both sides, with the result that France took the high-handed step above-mentioned, despite the protests of the Swiss and in disregard of an excellent suggestion that the whole matter be referred to the International Court of Justice.

SYKES, SIR MARK (1879–1919). An English public official, born at Sledmere, Yorks., and educated at Cambridge. He served in the South African War in 1902 and became secretary to Sir George Wyndham in Ireland in 1904. In 1905 he went to Constantinople as attaché to the British embassy. His knowledge of Mesopotamia and

Palestine proved invaluable during the War, and he was sent on important special missions to Russia, Mesopotamia, and Syria. He also raised a battalion of the Yorkshire regiment. His books include: *Through Five Turkish Provinces* (1900); *Dar-el-Islam* (1903); *Five Mansions of the House of Othman* (1909); *The Caliphs' Last Heritage* (1915).

SYKES-PICOT TREATY. See MESOPOTAMIA; WORLD WAR, DIPLOMACY OF THE.

SYNDICALISM. Syndicalism is a form of revolutionary socialism which, although based on the Marxian theory of the class struggle and of the failure of capitalism, repudiates the state, political organization and activity, and the ownership of the means of production by the state or any other political organization. Instead it believes in strictly industrial organization and in the ownership of the means of production by groups of producers It regards the industrial union as the unit of organization. Its aim, the industrial society, is to be composed of the aggregate of these coördinated industrial units. Control of production is to be vested in the workers Toward that end syndicalism employs revolutionary tactics· the general strike, direct action, sabotage, etc. (See SABOTAGE). The syndicalists take pride in possessing a hard realism which takes account of the existing situation, employs such methods as are required to attain a given end, and does not permit emotion to enter into the issue.

The years 1914-24 were of marked importance for the syndicalist movement. Although it suffered reverses in some countries, as in France, it made on the whole important forward strides. For the first time efforts were made at international syndicalist unity. A number of syndicalist organizations were affiliated with the Red International of Labor Unions, organized at Moscow, July 15, 1920. In opposition to this body, because it was "not capable of organizing the revolutionary workers of the world into one compact fighting body" and was, moreover, an offshoot of communism, the strictly syndicalist International Workmen's Association was established in Berlin, December, 1922–January, 1923.

The foremost syndicalist organization in the United States was the I. W. W. (see INDUSTRIAL WORKERS OF THE WORLD). In spite of its loose membership and numerical inferiority this organization played an important rôle in the American labor movement through the revolutionary aggressiveness of its policy and the individual initiative of its members. During this period it spread to a number of new industries. At the 1916 convention the industrial union was made the basis of its organization. Because of the violent opposition of the I. W. W. to the War, 95 of its members were sentenced to long terms of imprisonment in September, 1917, at Chicago. In addition, the organization and its members were prosecuted by a number of individual States, notably California. But the strength of the I. W. W. appeared not to have suffered to any great extent. The outstanding postwar developments were the Centralia, Wash., affair, and the amnesty granted to the members of the I. W. W. who had been imprisoned under Federal law. This amnesty did not, however, apply to the State prisoners. The I. W. W. is not affiliated with any international organization. At the Fifteenth General Convention at Chicago, November–December, 1923, a membership of 58,000 was represented. Contrary to the general belief, the membership of the I. W. W. does not consist primarily of foreigners but of native Americans of old stock.

In France, the homeland of syndicalism, the syndicalist movement weakened greatly and after the outbreak of the War its adherents became the minority in the General Confederation of Labor, instead of being as before the dominating group. This syndicalist minority seceded in 1921 and formed the revolutionary General Confederation of United Labor. In England the syndicalist movement became very strong during the latter part of the War, and afterward, but its influence was indirect and manifested itself within the existing labor organizations. Syndicalist influence was clearly apparent in the Clyde strikes and the shop stewards movement during the War, and the activities of the Triple Alliance in the postwar period. There existed a syndicalist organization in Germany with a membership of 100,000, but it was very insignificant in comparison with the strength of the socialists and communists in that country. Italy has two syndicalist organizations, the Italian Syndicalist Union and the Italian Union of Labor Their aims were nearly identical and their membership was in 1924 rather low, due to the general decline of radicalism under the Fascist rule. There were also considerable syndicalist elements in Spain, Canada, New Zealand, Australia, South Africa, and Argentina.

SYPHILIS. In the period between 1914 and 1924 our knowledge of this disease continued to increase in several directions. Historically the attempts of the late Iwan Block to uphold the dogma that Old World syphilis was derived entirely from the American aborigines largely were set at nought. Even if the returned mariners of Columbus did become contaminated in America, and even if they did originate a focus of disease in Spain, there are no good reasons for doubting that the malady was already existent in the Old World. Medical history writing has made great advances in recent years, and a new technic has developed. From the purely documentary side it is difficult to uphold the existence of a great European epidemic of the disease late in the fifteenth century. The records of cities, which according to tradition were ravaged by the disease, show no evidence in their archives of any unusual disbursement of public funds during 1495 and subsequent years. Students of old civilizations such as those of Persia and Egypt have pointed out that some of the modern folk designations of syphilis are of high antiquity. It is increasingly evident that the history of syphilis should be rewritten along purely scientific lines, paying little heed to old writers who wrote consciously of the disease on a basis of gossip and tradition.

The belief that syphilis prevails in proportion to the amount of commercialized vice which obtains in a given locality seems to rest on a fallacy of some sort. Since the disease has been reportable there is no evidence of any notable falling off in its incidence, and a large proportion of fresh infections escapes record. New York City in 1924 was quite free from commercialized vice and had been free for some years previously; yet there was an average of 400 new cases reported every week, which means 20,000 annually, a figure which is no index of

the actual number of new infections. In addition, the number of United States and Canadian youth infected in Europe was said to have been very large, fully justifying the use of the prophylactic measures which are often condemned unjustly as condoning vice.

The opinion gained ground during the War that no opprobrium can be attached to medical authority when the efforts at prevention take place after the soldier has been exposed to the danger of contracting the disease. Neglect under such circumstances would be criminal. In regard to prophylaxis before the exposure, this has been well defended on economic grounds, because an infected soldier or sailor becomes a charge on his command and must be interned and treated and prevented from disseminating his disease. But all prophylactic measures whether undertaken before or after exposure, as well as all rapid and certain measures of treatment, have been attacked by moralists as inciting to further immorality by withdrawing the discipline of punishment

The enormous vogue of Salvarsan in the treatment of syphilis is best shown by the fact that the discovery of how to make this German proprietary by United States chemists during the War is said to have netted the United States government half a million dollars from the sale of the drug to consumers through distributing firms.

In speaking of the persistence of syphilis despite the abolition of officially or otherwise segregated vice districts, a word must be said as to the effects of Prohibition, which it was hoped would work favorably against the spread of the disease. Many cases of infection were formerly directly traceable to intoxication, and it was often claimed that commercialized vice could not flourish without alcohol. Nevertheless, as already pointed out, the incidence of the disease does not diminish in large cities; and either Prohibition does not prohibit, or diffusion of the disease is only slightly affected by alcoholic indulgence.

Under the head of treatment, two facts stand out It has been discovered that soluble bismuth salts are valuable as an antisyphilitic, although unlikely to supplant the older remedies; and quite recently the culture of the plasmodium of malaria has been found efficacious in the early stages of paresis.

SYRACUSE. A city of New York State. The population increased from 137,249 in 1910 to 171,717 in 1920 and to 184,511 by estimate of the Bureau of the Census for 1923. The authority of the city planning commission was extended in 1923 to cover supervision of new developments in the outskirts of the city. A $2,500,000 school building programme was being carried out in 1924. The number of industrial plants increased from 760, employing 25,000 persons in 1915 and producing goods valued at $52,226,000, to about 1000 in 1924 with 32,000 employees.

SYRACUSE UNIVERSITY. A coeducational institution at Syracuse, N. Y., founded in 1870 and fostered by the Methodist Episcopal Church, but nonsectarian in administration and policy With the exception of the war years, the number of students registering increased steadily from 3933 in 1914 to 5034 in 1923–24, with 903 in the summer session of 1923 and 1100 additional in the extension division. The faculty increased correspondingly from 300 to more than 500 members, and the library from 100,000 to 150,000 bound volumes, and 70,000 pamphlets. By gift and legacy the university received about $1,000,000 from Mrs. Russell Sage. John D. Archbold's gifts, including the stadium and gymnasium, aggregated over $2,000,000. The School of Nursing was established in 1915, and the College of Home Economics was opened as a school in 1918, and made a college in 1921. The College of Business Administration was established in December, 1920, having been founded as a school in September, 1919. The evening session opened in 1918. Charles W. Flint, D.D., LL.D, succeeded James R. Day, D.C.L., LL.D., as chancellor in 1922.

SYRIA. A former province of the Turkish Empire in Asia but after 1920 a republic whose affairs were supervised by France as a mandatory power. The French mandate for Syria was confirmed by the League of Nations on July 23, 1922. Administratively the republic was divided into the following: (1) the Syrian Federation, comprising the three territories of Damascus (area, 41,640 square kilometers; population as estimated for 1922, 995,000), Aleppo (area, 61,775 square kilometers; population, 718,000), the Alaouite (area, 6200 square kilometers, population, 410,000); (2) Territory of the Greater Lebanon, an autonomous area proclaimed a state in 1920 (area, 25,000 square kilometers; population, 710,562); (3) Territory of Jebel Druze (area, 9760 square kilometers; population, 101,000); (4) Military Zone (area, 38,000 square kilometers; population, 400,000). Total for whole mandate territory: area, 182,375 square kilometers; population, 3,334,562 The population was for the most part of Arabic origin, and Arabic was the prevailing language. Other nationalities represented were Turks, Turcomans, Kurds, Circassians, Armenians, Persians, Jews. A religious classification showed the following: Sunni Moslems (1,200,000), Shiah Moslems (120,000), other Moslems (300,000), Eastern Christians, i e. Greek Orthodox, Armenian Orthodox, etc. (1,210,000), Catholics (20,000), Jews (principally in the four large cities). The important cities with their 1921 populations were Damascus (250,000), Aleppo (200,000), Beirut, capital of Greater Lebanon (150,000), Hama (60,000), Homs (50,000), Tripoli (35,000), Antioch (30,000), Alexandretta (15,000). Education was supported by the French, British, and American missions The last maintained a college at Beirut as did also the Jesuits and Greek Catholics. Female education was receiving considerable attention.

Industry. Syria was an agricultural country though it was estimated that only 10 per cent of the lands west of the Euphrates was being tilled. Of the million acres being worked, fully 750,000 were under wheat and barley. The wheat raised was entirely for local consumption, while barley, after 1919, was being exported in considerable quantities to England and Germany to be used in the making of beer. Other crops of importance were sesame (from which oil was produced), tobacco (1922 yield, 2587 tons), olives (1922 yield, 761 tons), silk, oranges, lemons. Live stock suffered severely during the War, as may be seen by the fact that sheep and goats numbered 4,800,000 in 1914 and only 2,408,000 in 1920, cattle 500,000 in 1914 and only 293,000 in 1920, horses and donkeys 270,000 in 1914 and only 143,000 in

1920. Lead, iron, copper, nickel, lignite, petroleum, and other minerals were discovered but none was mined in paying quantities. Manufacturing was still in an embryonic stage. Sericulture, oil, soap, flour received some attention.

Trade. Previous to the War exports averaged 60,000,000 francs ($11,670,000) and imports 124,000,000 francs ($23,932,000). That the country's trade was showing some recovery after 1920 was revealed by the trade figures for the subsequent years. Imports for 1921 and 1922 were (franc converted at $0 075 for 1921 and $0 082 for 1922): $44,131,575 and $41,119,392. Exports for the same years were valued at $5,238,600 and $7,206,448. The very high adverse trade balance and the falling off of the transit trade with the interior because of customs barriers indicated that the economic situation was a difficult one. The country's revenue (i. e. invisible exchange) was being derived mainly from the spendings of the French army of occupation and from remittances sent by Syrians in North and South America. Leading exports were wool, hides, olive oil, tobacco, fruits, wine, etc. Leading imports were cotton goods, food products, iron and steel, building materials, etc Principal countries of origin in value of imports in 1922 were United Kingdom, France, Egypt, Italy, Germany, United States, Belgium, Turkey Principal countries of destination in value of exports in 1922 were France, Egypt, Turkey, United States, Italy. The port of Beirut handled three-fourths of all the trade Other customs ports were Tripoli, Alexandretta, Aleppo, Damascus.

Communications. There were, in 1922, 1569 miles of railway in Syria. A line traversed the interior from north to south with branches to the chief ports. Alexandretta, by way of Aleppo, was connected with the Bagdad railway which had 190 miles of line in Syria. Damascus, similarly, was on the route of the Hedjaz railway into the south. The railways, because of the hard use with which they met during the War, were in a bad state of disrepair when the French took them over in 1920.

Finance. In May, 1920, the unit of currency was made the Syrian pound (£S), equivalent to 20 French francs ($3 96). Notes were issued by the Bank of Syria and by Jan 1, 1922, there were notes to the value of 201,626,334 francs in circulation The 1922 budget called for revenues of 129,725,000 francs and expenditures of 162,726,000 francs. In 1921 the whole mandate territory had received a subsidy of 25,000,000 francs from the French government, but in 1922 this grant was discontinued in the hope that the local budgets could be made to balance. Revenues for 1922 were greater than those of the previous year and expenditures were cut considerably. The result was a smaller deficit in 1922 and 1923. The Syrian pound continued, however, to depreciate. In October, 1922, it was worth $1.49.

Defense. The forces maintained by the French government in the territory were progressively diminished as disorders decreased. On Jan. 1, 1922, 70,000 troops were stationed in the country; by Sept. 1, 1922, these had been reduced to 31,500. A Syrian legion was being built up around a nucleus of 6500 men.

Government. The Syrian Federation, formed June 22, 1922, was governed by a federal council of 15 members which had charge of the budget, the fixing of duties, and the construction of public works. Each of the three territories in the federation was headed by a governor who was advised by a representative of the French High Commissioner. Similarly, Greater Lebanon was governed by an elected administrative council. The active head, however, was a French governor. The French High Commissioner was the representative of his government in the mandate territory and exclusively in charge of foreign affairs as well as the military and naval forces. The French government provided 50,000,000 francs for the maintenance of the High Commissioner in 1922 and 7,000,000 francs in 1923. To this office General Gouraud was appointed in October, 1919; in April, 1923, General Weygand was named as his successor.

Economic Conditions. That the commercial situation in Syria was steadily improving was shown by the developments of 1923 While there was a decrease in imports of over $10,000,000 there was an increase in exports of about $8,000,000, or over 100 per cent as compared with 1922. Several factors contributed to this situation The silk crop was good, the yield being slightly greater than the preceding year, and was disposed of at a higher price. The cereal harvest was so abundant that a considerable amount was exported. The cotton crop showed an increase of about 6000 bales over that of 1922, reaching a total of about 14,000 bales of 220 pounds each. The price was double that of 1922. The 1923 harvest of fruits, vegetables, medicinal plants, etc., was quite satisfactory, and commanded good prices. The year 1923 also saw a revival of the reëxport trade. There was a slow but gradual revival of trade with Anatolia, and trade with Palestine and Transjordania showed a substantial increase The development of the motor caravan service with Iraq, recently established across the desert between Syria and Bagdad, promised to increase this trade, too, which, formerly, had been a most profitable one for Syria.

History. Though French and British troops did not move on Syria until late in 1918, the location of the country as one of the important transit lands between the east and the west made it the scene of extraordinary hardships for the population. As a result of conscriptions, deportations, disease, starvation, and the exactions of their Turkish rulers, as well as the stringency of the blockade, the native Syrians had been depressed into a condition of complete helplessness. By 1918, it was estimated that the population of the vilayet of Beirut alone had fallen off 150,000. But the débâcle of the Turk, with the capture of Damascus, Tyre, Beirut, Homs, Tripoli, Hama, Aleppo, Alexandretta, during October-November, 1918, and the arrival of French and British troops did not serve to put the fears of the population at rest. Those agreements among the Allies for the partition of the Near East which had been made public had taught the Syrians that an interest in them was not occasioned by strictly altruistic motives. By the secret treaty of London of 1915 and the Sykes-Picot agreement of 1916, Turkey in Asia had been partitioned into spheres of influence among the Allies, the Syrian coast and hinterland falling to France. The British and French armies of occupation were received therefore with open hostility. The withdrawal of British troops in November, 1919, left the French in a precarious position. The proposals of the Syrian Congress of July

2, 1919, for a free Syrian state to extend into Palestine and a request for an annulment of those agreements whose purpose was the partition of Syria having met with rejection, the anti-European hatred was fanned into flame. Affairs were further complicated by the pretensions of Emir Faisal, son of King Hussein of the Hedjaz, who sought to found a constitutional monarchy in Syria and at the same time maintain the friendship of the British and French. Fighting broke out late in 1919 and continued through 1920. Baalbek fell before the Arabs and was recaptured by the French. The French garrison at Alexandretta was attacked in February, 1920 On Mar. 8, a Syrian National Congress meeting once more at Damascus repeated the programme for complete independence and offered the crown to Emir Faisal Emir Faisal accepted and formed a government, much to the delight of Syrian Nationalists. The result was a rekindled ardor, and the attacks on the French increased in number, against, of course, the counsels of the new King, whose desire it was to conciliate the French. Antioch fell before an Arab force in March, while disorders spread far to the south into Palestine. Assistance was received from the Angora government in the north and stubborn fighting went on between the Turks and the French in northern Syria during the whole of 1920. The Nationalists, disregarding General Gouraud's threat that the French mandate would be enforced by arms, attacked the French army sent to occupy Damascus (July, 1920). The result was an overwhelming victory for the French, the occupation of Damascus, and the overthrow of Emir Faisal, who was compelled to leave the country (Aug. 4, 1920) French control was thus complete, though Arab Nationalists continued to make the task of the French administration a difficult one.

In the south in particular (the Hauran district) Nationalists remained in control until April, 1921. Under General Gouraud, pacification proceeded rapidly, plans were started for the economic reconstruction of the country, and new administrative machinery was established. Lebanon, in the south, was given autonomy and enlarged by attaching the plains of Bekaa to the mountains of Lebanon. Jebel Druze (south of Hauran) likewise became an autonomous unit, with an elected council and a Druse governor. The remainder of the mandated territory was divided into the three states of Aleppo, Damascus, and the territory of the Alaouites, each state having a more or less representative and autonomous State Council, and sending five delegates to the Federal Council of Syria. In reality, however, the French officials, under a high commissioner, were the government. As disorders decreased the army of occupation was cut down, so that by September, 1922, only 31,500 men were under arms. It was therefore evident in 1923 that the French were meeting with success in their attempts to restore the country to its former economic importance.

By the Treaty of Sèvres (Aug. 10, 1920), Turkey renounced Ottoman sovereignty over Syria, including Cilicia, and by subsequent action of the Council of the League of Nations, July 22, 1922, France was formally intrusted with a mandate over Syria, although formal promulgation of the mandate was further postponed by Italian objections. The southern and eastern boundaries were fixed in principle by an Anglo-French Convention of Dec. 23, 1920, and definitively by an Anglo-French Agreement of Feb. 3, 1922, effective Mar. 10, 1923. The northern frontier, which by the Sèvres treaty had run eastward from the gulf of Alexandretta to the Tigris, including the corresponding section of the Bagdad Railway, was modified by the Franco-Turkish Treaty of Angora, Oct. 20, 1921; by this treaty France restored to Turkey not only Cilicia but also a long strip running eastward almost to the Tigris and including the Bagdad Railway from a point near Aleppo to Nisibin—about 9000 square miles in all. This new boundary was confirmed by the Treaty of Lausanne, July, 1923. Throughout the first half of 1924 a French censorship prevented the transmission of political news from Syria. However, reports were occasionally received, from plainly partisan sources, of the despotic character of the French administration. It was charged by Syrian propagandists in the United States that the French High Commissioner was vested with all civil and military powers, that the local representative assemblies were merely consultative, that French methods were those applied in the negro colonies where an inferior race was being governed, that the censorship exercised was rigorous, and the upkeep of government costly On the other hand, the French record revealed the following achievements: native Syrian control of police, navigation, mails and telegraph; French subsidization of private schools and an increased school attendance since 1921; extensive aid rendered to Armenian and Greek refugees; irrigation works in cotton areas in particular. In May, 1924, General Weygand was appointed High Commissioner.

SZYMANOWSKI, KAROL (1883–). A Polish composer, born at Timoshevka, Southern Russia. He studied with S. Noskowski in Warsaw, where he made his home. Beginning as an imitator of Chopin, with an admixture of impressionism, he rapidly drifted to Futurism. He wrote two operas, *Hagit* (Warsaw, 1922) and *Le Roi Roger* (not yet produced in 1924); two symphonies; a symphonic poem, *Penthesilea;* a concert overture; a piano concerto and a violin concerto; a number of pieces for violin and piano; and piano pieces.

T

TACNA-ARICA DISPUTE. An international controversy between Chile and Peru that was argued intermittently following the conclusion of the Chilean-Peruvian War and the Treaty of Ancon of 1884. By the treaty, Chile was awarded the province of Tarapaca outright. The provinces of Tacna-Arica, on the other hand, were to remain in Chile's possession for 10 years, upon the conclusion of which a plebiscite was to be held in the territory to decide its ultimate disposition. A payment of 10,000,000 Peruvian *soles* (Chilean dollars) was to be made to the defeated contestant nation. Chile's contention was that the plebiscite provision was inserted in the treaty to allay Peruvian national feeling, it being the intention of the peace commissioners that Chilean sovereignty should remain uncontested, and for that reason no terms were formulated for the holding of the plebiscite. The year 1893 found Peru demanding the execution of the treaty but proposing such arbitrary conditions, e.g. that only Peruvian citizens be permitted to vote in the plebiscite, that no understanding could be reached. The point became a cause célèbre in both countries, political campaigns being waged on it as the single issue. Chile several times signified her desire to observe the terms of the treaty but in each instance was met by Peru's irrevocable demand. Relations were broken off in 1901, resumed in 1905, to be again severed; and again the same play was enacted in 1910 and in 1913. Chile meanwhile had spent great sums in the development of the provinces, commencing irrigation, sanitation and port development projects, and spending $25,000,000 on the railroad from Arica to La Paz, Bolivia, alone It could therefore justly point to the great differences existing between conditions in the contested provinces and those in the neighboring Peruvian territories.

In 1919, aroused by the anti-Peruvian riots in Chilean cities, and the publication of the Chilean-Bolivian treaty of 1905, by which Bolivia had been promised an outlet to the sea by way of the city of Arica, Peru once more pressed her claims. In 1920, she asked that the question be put on the agenda of the Assembly of the League of Nations, only to withdraw the request soon after. In 1921, Chile once more sought the holding of a plebiscite, but meeting no response except the demand that the whole treaty be reconsidered, broke off negotiations. Meanwhile Bolivia, on the grounds that the question had become a universal one and involved the freedom of the Pacific, interjected herself into the affair. It was not until 1922 that the first hope of a settlement appeared. On Jan. 17, 1922, the United States despatched identical notes to Chile and Peru for the purpose of effecting an agreement. On July 15 a protocol was signed by representatives of both nations nominating the President of the United States as arbiter; Chile and Peru accepted the protocol as the basis for discussion, and in February, 1923, delegates arrived at Washington, and the long process of investigation, filing of briefs and counterbriefs, was begun; Peru's final brief was not filed until April 12, 1924.

TACOMA. A city and port of Washington. The population rose from 83,743 in 1910 to 96,965 in 1920, and to 101,731 by estimate of the Bureau of the Census for 1923. A zoning ordinance was adopted in 1919, and an active city planning programme was undertaken in 1920. A notable building programme, begun in 1923, was continued through 1924. Two and a half millions were voted for new public schools, new edifices were constructed for the College of Puget Sound and Annie Wright Seminary, and office, church, hotel, and fraternal buildings were completed during 1914–24. Under a comprehensive port development project, organized in 1918, huge piers were built and publicly owned and operated. Tourist travel to Mt. Rainier (Mt. Tacoma) in Rainier National Park multiplied several times. Camp Lewis, a permanent divisional establishment of the United States Army, was developed, and a costly psychiatric hospital was built for war veterans at American Lake in the environs of the city.

TACTICS, MILITARY. See STRATEGY AND TACTICS.

TAFT, HENRY WATERS (1859–). An American lawyer (see VOL. XXI). In 1917–19 he was chairman of the permanent legal advisory board for Greater New York under the selective service regulations. He was a delegate to the Republican national convention in 1920 and chairman of the coalition campaign committee in the mayoralty election of New York City in 1921. He was president of the New York State Bar Association (1919–20) and became president of the Association of the Bar of the City of New York in 1923.

TAFT, WILLIAM HOWARD (1857–). A president of the United States (see VOL. XXI). He was appointed a member of the National War Labor Conference Board in 1918 and was president of the League to Enforce Peace, engaged in the promotion and ratification of the Treaty of Peace and the League of Nations. On June 30, 1921, he was appointed Chief Justice of the Supreme Court of the United States.

TAHITI. See PACIFIC OCEAN ISLANDS, *Society Islands.*

TALC AND SOAPSTONE. Talc and soapstone share with sulphur, petroleum, and copper the distinction of being one of the minerals of which the United States produces more than all the rest of the world. In 1900 the United States produced approximately 90,000 short tons of talc, valued at about $900,000. In 1910 the production had increased to 150,000 short tons, valued at $1,600,000, while in 1916 it had

increased to 213,561 tons, valued at $2,253,803; by 1922 it had declined to 198,684 tons, valued at $2,859,897. In addition, talc was imported into the United States, mainly from Canada, Italy, and France. The talc is used for gas-burner tips, while the soapstone is an insulator of heat and electricity. Soapstone bricks are used for the lining of digesters and furnaces in which the sulphate pulp is treated in making Kraft paper. Talc is also used for talc powder, textiles, paper, soap, and rubber.

TALMADGE, CONSTANCE (MRS. JOHN PIALOGIOU) (1900–). An American actress, born at Brooklyn, N. Y. She began acting in moving-pictures in 1916 and soon became very popular. Besides other plays, she appeared in *Intolerance, Mrs. Leffingwell's Boots, Romance and Arabella, In Search of a Sinner, Two Weeks, A Temperamental Wife, The Perfect Woman, Mama's Affair,* and *Polly of the Follies.*

TALMADGE, NORMA (MRS. JOSEPH M. SCHENCK) (1897–). An American actress and motion picture producer, born at Niagara Falls, N. Y. She is a sister of Constance Talmadge. She began to act in moving-pictures at 14 years of age and soon achieved notable successes, among them being: *The Crown Prince's Double, The Social Secretary, The Secret of the Storm Country, The Ghosts of Yesterday, Her Only Way, The Forbidden City, The Passion Flower, The Sign on the Door, The Wonderful Thing, Smilin' Through, Secrets.*

TANA TUNNEL. See TUNNELS.

TANGANYIKA TERRITORY. Formerly German East Africa (q.v.), but since 1919 a British mandate territory, situated in south-eastern Africa, with an area of 384,079 square miles, and a native population (April, 1921) of 4,107,000. There were also 14,991 Asiatics and 2447 Europeans on that date. Dar-es-Salaam, the capital and chief commercial centre, had 20,000 inhabitants; Tanga, 16,400; Tabora, 25,000. In 1922, slavery had not yet been abolished, though legislation was in the course of preparation. Under British rule, because of the inevitable readjustments, industry and trade took some time in regaining their normal status. Imports for 1913 were valued at £2,667,925; in 1921, £1,426,125; in 1922, £1,386,212. Exports for 1913 were £1,777,552; for 1921, £1,089,990; for 1922, £1,300,083. The chief exports in 1922 in order of value were sisal hemp, coffee, ground nuts, cotton, grain, copra, hides. The chief imports were cotton piece goods, foodstuffs, building materials, coal, machinery, tobacco, spirits. Purchases were made largely in Zanzibar, Kenya, United Kingdom, and India, and 80 per cent of the trade was carried in British bottoms. Imports from the United States were only £1193 in 1922 to Germany's £43,765 and the Netherlands' £20,087. Imports passed for the most part through the port of Dar-es-Salaam, while Tanga handled most of the exports. The main inland routes were still the two railways built by the Germans.

The victories of the British and Belgian troops in East Africa left the Territory completely under Allied control. In May, 1919, the Supreme Council turned the area over to Great Britain as a mandate territory, but by agreement with Belgium in September, 1919, the western provinces of Urundi and Ruanda were ceded under mandate to the Belgian Congo in order to give the latter a frontage on Lake Tanganyika. Great Britain retained such areas as were needed to allow for the projected Cape to Cairo railway as well as the disputed Ujiji province which contained the western terminus, Kigoma, of the important Central Railway. In 1921, however, Belgium was given the right to use the railway free of duties. Under the Order in Council of July 22, 1920, the British administrative machinery was set up with a governor and a nominated executive council. By the Covenant of the League of Nations, perfect racial equality in matters of residence and trade was assured with the result that the Indians, unlike those in the Kenya Colony to the north, were permitted unhampered social and economic liberty. As a result they rapidly penetrated into all regions of the Territory in the rôle of small traders. By 1921, the British administration was functioning normally; German estates had been sold; the Indian penal and civil codes were introduced; the basis of the currency was made the shilling (Jan. 1, 1922); English names and weights were substituted; and the Kenya Colony system of revenues was installed, i.e. customs duties, trade taxes, native hut and poll taxes. Revenues for 1917–18 were £336,446 and expenditures £157,285; for 1921–22, £978,192 and £1,807,890; for 1923–24 (estimate), £1,257,540 and £1,936,109. Grants were necessary from Great Britain to make up the deficits, the aid being £350,000 in 1920–21, and £914,000 in 1921–22.

TANGIER CONTROVERSY. The status of Tangier port, which, because of its strategic position at the entrance to the Mediterranean, was an intimate concern of the foreign offices of France, Spain and Great Britain, became a serious cause for ill feeling in the years following the War. Spain's attempts during 1919–21 to effect a Franco-Spanish understanding on the basis of an enlarged Spanish interest in Tangier (and thus negate the policy of internationalization temporarily agreed upon in the Franco-Spanish Treaty of Nov. 27, 1912) were rebuffed, for they conflicted with the French ambition which looked to the expansion of French interest not only over Tangier but the whole of Morocco as well. In 1922, Great Britain, finding that the subject was assuming major importance, interjected herself into the controversy and insisted that the entire question be reopened. In July, 1923, a commission composed of French, Spanish and British experts met for the purpose of preparing a new agreement. Early it became evident that the question had taken on an international character, when both the United States and Italy indicated their interest, the United States on the general ground that it had figured in the Algeciras Conference and would therefore be concerned in any new understanding, Italy because of her position as a Mediterranean power. The sittings of the commission were therefore frequently interrupted, as the experts found it necessary to repair to their home governments for further instructions. In October, Italy, with the approval of Spain, demanded that her delegates be given seats at the conference. In October, 1923, the American Department of State made public a note addressed to the British, French, and Spanish governments in which the request for the maintenance of the open door in the settlement of the status of Tangier was reiterated. It was not until Dec. 18, 1923, that the sittings were completed. The pro-

visional agreement, as submitted to the Governments of Great Britain, Spain, and France, contained the following provisions. The Tangier Zone, whose permanent neutrality was assured, was to continue as a part of Morocco under its own constitution. The Municipality of Tangier was to be under both a Committee of Control, made up of the eight consular officers of the powers that had signed the Algeciras agreement, and an International Legislative Assembly consisting of representatives of the powers (Italy here included) and the native Mussulmans and Jews. The customs service, though administered by the Moroccan government, was to be under the control of the international administration Economic equality at the port was to be observed; the capitulations were to be supplanted by a mixed tribunal of French, Spanish, and British magistrates; no fortifications were to be erected; the signatories of the Algeciras agreement (the United States included) were to be invited to adhere to the new convention as soon as it received the ratification of the three contracting parties. That the British and French governments would approve was certain; as to the attitude of Spain, there was at first much doubt, but in 1924 Spain's adherence to the convention was made unconditional. It was conceded generally that Great Britain had won a diplomatic triumph in the new pact over the Mediterranean countries, France, Spain, and Italy, and by the internationalization of the port had made sure of the safety of the route to India

TANKS, ARMORED See STRATEGY AND TACTICS.

TANNENBERG, BATTLE OF. See WAR IN EUROPE, *Eastern Front.*

TARDIEU, ANDRÉ (1876–). A French public official and author, born in Paris, and educated at the Lycée Condorcet and Ecole Normale Supérieure. He was High Commissioner of France to the United States (1917–19) and Minister of the Liberated Regions and also Minister Plenipotentiary at the Peace Conference (1919–20). In the French Chamber of Deputies in 1923 he led a Nationalist party group which found Poincaré too lenient toward the Germans. His writings include: *Questions Diplomatiques de l'Année* (1904); *La Conférence d'Algésiras; Notes sur les Etats-Unis* (1908); *France and the Alliances* (1909); *Le Prince de Bulow* (1909); *Le Mystère d'Agadir* (1912); *L'Amérique en Armes* (1918); and *The Truth about the Treaty* (1921).

TARIFF IN THE UNITED STATES. *Recent Developments in Tariff Legislation in the United States.* The Underwood Tariff of 1913 lowered the rates which had existed under the Payne-Aldrich Bill The average rate on dutiable goods in 1910 was 42 per cent; in 1915, 33 per cent. The Underwood Tariff Bill also increased the free list. As a result, 63 per cent ad valorem of the goods admitted to the United States in 1915 paid no duty. This was 14 per cent more than in 1910. The construction of a tariff bill is becoming very difficult and complicated. The Underwood Bill covered more than 100 pages and actually enumerated more than 3000 different articles; the list of nondutiable goods was also given. The goods on which duty was to be paid were cited in 14 schedules, the rates ranging from 5 per cent on bar iron to 60 per cent on jewelry, playing-cards, and expensive silk goods. The general result of such a voluminous bill was to confuse the average citizen, and Congress itself felt that the guidance and assistance of experts was greatly needed. A Tariff Board had been provided for in the Payne-Aldrich Bill of 1909, but when the Democrats came into power, it was abandoned So much difficulty was experienced by Congress in the construction of the Underwood Tariff Bill that the Democrats themselves provided in 1916 for a new Tariff Commission, the function of which was to advise the President and Congress on general problems relating to the tariff. The Tariff Commission, in furnishing the required guidance and assistance, should stand in somewhat the same relation to Congress that the Federal Reserve Board occupies with reference to matters of banking and credit. Up to 1924 there was little evidence that the Tariff Commission had been able to impress itself on Congress so as to make the tariff bills simple and effective.

The Fordney-McCumber Bill of 1922. When the Republicans were swept into power by the election of 1920, it was on the distinct understanding that the tariff rates would be revised upward Many citizens seriously thought that such a revision would tend to bring about relief from the depression of 1920 Congress had great difficulty in drafting a bill which was under consideration for 20 months The Senate finally adopted the bill after 2436 amendments had been made to the original. It was not until 1922 that the legislation known as the Fordney-McCumber Bill was passed. The rates of duty are the highest in United States history. Duties were levied on agricultural products, sugar, wool, woolen goods, cotton goods, silk, metals and metal manufactures, tobacco, spirits and beverages, chemicals, jewelry, earthenware and glassware, wood, paper, and many other classes of commodities. High rates were levied on wool, on certain grades of which the duty reached 155 per cent. Rates on cutlery in some instances were as high as 40 per cent ad valorem The rates on embroidery and cotton lace were 90 per cent Many of the articles which had been put on the free list by the Democrats in 1913 were made dutiable under the Fordney Bill. The few articles left on the free list included coffee, cocoa, agricultural implements, newsprint, hides, raw cotton, tea, gunpowder, tin, and potash

Most students of economics and many businessmen believed that the Fordney-McCumber Bill was a mistake. The United States is a creditor nation. The only way in which foreign debtors can pay it is by sending goods. The price which consumers must pay for protected goods is probably not compensated for by any stimulation which industry may have received from the provisions of this bill. The United States cannot continue to export goods unless imports from other countries are received One of the most interesting features of the Tariff Act of 1922 was the flexible tariff provisions. When the President of the United States, "after careful investigation, finds that the rates of duty in the Tariff of 1922 do not in fact equalize the costs of production of any article or articles between the United States and the principal competing foreign country, he shall determine the rates that will so equalize such difference: and 30 days after the proclamation is made the rates of duty proposed by him shall be in effect on the articles named in

the proclamation in lieu of the rates of duty specified in the Tariff of 1922. These rates of duty are to be based upon foreign valuation. He cannot increase or decrease any rate of duty more than 50 per cent of the amount thereof as provided in the Tariff of 1922." It would be a great gain if the Tariff Commission could actually study production costs of foreign competitors and recommend tariff rates on such a basis. This would give a scientific foundation for tariff duties which the United States has never had.

Retaliatory Provisions. Section 317 of the Act provides that "when any foreign country discriminates against articles wholly or in part the product or products of this country, by imposing, directly or indirectly, by any unreasonable charge, fee, duty, exaction, regulation, or limitation, or other method of discrimination and the commerce in them, and the President finds in fact that said foreign country has done and continues so to do, and that the American public interest will be served thereby, he shall by proclamation declare such new and additional rates of duty, as will offset the burdens placed upon our commerce, not exceeding 50 per cent ad valorem on the commodities from the offending country or countries named in his proclamation; or he may by proclamation exclude the articles named. The provisions of a proclamation become effective 30 days after its date. It is the duty of the Tariff Commission to continually make investigation concerning the welfare of our commerce abroad, and to bring to the attention of the President any discrimination."

The Tariff Commission under Section 318 was directed to compile costs of production, import costs, and producers' selling-prices at home and abroad This information would make it possible for the President and Congress to put into effect the retaliatory measures which Congress thought advisable to protect the United States in her search for foreign markets. It was uncertain what the results of the provisions for retaliation and for flexibility in the tariff rates would be. It was hoped that they might lead to trade agreements with foreign countries which would operate according to the "most favored nation" clause. If this should prove to be the result, it would probably be the greatest gain derived from the Tariff Law of 1922

See UNITED STATES, *History*. For tariff legislation in other countries, see section on *History* under those countries. See also FINANCE AND BANKING.

TARKINGTON, (NEWTON) BOOTH (1869–). An American author (see VOL. XXI). His later writings include: *Penrod* (1914); *The Turmoil* (1915); *Penrod and Sam* (1916); *Seventeen* (1916); *The Magnificent Ambersons* (1918), for which he was awarded the Pulitzer prize by Columbia University; and *Alice Adams* (1921); *Gentle Julia* (1922); *The Fascinating Stranger* (1923); and *The Midlander* (1924). His plays are for the most part light and entertaining. The most important are: *The Man from Home* (1906); *Master Antonio* (1916); *Clarence* (1919); *The Wren* (1921); *The Intimate Strangers* (1921); *Rose Briar* (1922); and *Tweedles and Magnolia* (1923).

TASMANIA. A state of the Commonwealth of Australia consisting of the island of Tasmania and several smaller islands. Area, 26,215 square miles; population in 1911, 191,211; in 1922, 213,400; average annual increase, 1.12 per cent. Hobart, the capital, including suburbs, had 52,163 inhabitants in 1921 (38,391 in 1911). Fruit growing was the only agricultural activity to show important increases. Pastoral pursuits were still comparatively unimportant (the wool clip of 1921–22 was smaller than that of 1913). The total mineral production for 1921–22 was £854,730, which was a considerable falling off. Gold, in 1913, yielded £141,876; in 1921–22, £23,471. The state's interest in the generating of cheap hydro-electric power augured an early industrial development. A plant created at Great Lake was designed to supply 70,000 horse power. The value of production for 1921–22 was: agricultural and pastoral, £4,592,004; mining, £854,730; value added by manufacture, £2,813,360 Imports and exports for 1913 were £1,025,081 and £522,865; 1921–22, £1,385,951 and £2,067,443 Exports were chiefly wool, minerals, timber, fruit and jam. Revenues and expenditures for 1913–14 were £1,238,085 and £1,235,514; for 1921–22, £2,180,395 and £2,302,077. The public debt in 1923 amounted to £22,439,176, of which 30 per cent had been spent on railways, 27 per cent on roads and bridges, and 10 per cent on hydro-electric developments. In 1914, the debt was £12,265,012. How prominent a rôle labor played in the state may be seen by the distribution of seats in 1922 in the parliament: Nationalists, 12; Labor, 12; Independent, 1; Country, 5.

TASTE. See PSYCHOLOGY, EXPERIMENTAL.

TAXATION IN THE UNITED STATES. The most important fact about recent taxation is the great increase in revenue derived from it. While State, municipal, and central bodies have all increased their revenues from taxes, the central governments of the belligerent nations are most conspicuous in this respect, for they have borne the main expense of the War. The net cost of the War has been estimated at $215,000,000,000, up to the end of 1920. This is such a large sum that the mind cannot comprehend it It is somewhat easier to realize the money cost of war if it is quoted as so much per day. Professor Seligman gives the following facts.

AVERAGE DAILY WAR EXPENDITURES IN MILLIONS OF DOLLARS

Date	Great Britain	France	Italy	Austria	Germany
1914–15 .	9 46	8 5	4.4	6.4	13.3
1915–16	18.16	12.2	7.5	8.7	15.9
1916–17	26 69	17 6	10 4	10.4	22.7
1917–18	33.36	32.4	6.5	12.3	31.0

Staggering as these figures seem, they are small when compared with the expenditures of the United States after its entry into the War. In the month of December, 1918, its average daily expenditure reached $64,500,000. During that month alone, the United States spent more than $2,000,000,000. These vast sums were not and could not have been raised by taxation; the larger part was obtained by borrowing. The ratio of tax receipts to expenditures in the different countries during the War was: in the United States, 25.9 per cent; Great Britain, 24.7; France, 15.4; Italy, 14.9; Germany, 11.7. Taxation would therefore be very important in the years following 1924.

Most of the war costs were still, in 1924, unpaid by the governments concerned.

Federal Taxation in the United States. Revenue derived from customs was no longer, in 1924, the important item in the Federal budget that it was 20 years earlier. In 1920, the receipts from customs comprised only about one-nineteenth of the total, which was $5,587,000,000. Almost all the balance came from "internal revenue." The subdivisions of the receipts under internal revenue for the years 1914, 1919, and 1920 were:

	1914	1919	1920	1920 Per cent of total revenue
1. Income tax	$60,710,197.52			
Income tax and excess profits				
2. Distilled spirits and beverages	226,179,689.76	$2,600,783,902.70	$3,956,936,003.60	69.2
3. Tobacco	79,986,639.68	490,233,073.72	197,332,105.84	3 4
4. Transportation, communication, and insurance		206,003,091 84	295,809,355 44	5 1
5. Luxuries (autos candy, furs, etc.)		252,348,453.61	307,769,841 36	5.3
6. Estate inheritance		81,357,473 54	270,971,064 27	4.7
7. Excise tax on corporations	10,671,077.22	82,029,983 13	103,635,563.24	1 8
Capital stock of corporations, brokers, etc		29,824,327 95	95,141,732.50	1 6
8 Stamps on legal documents		43,751,340 04	81,259 365.47	1.4
9 Admissions to amusements		58,664,876 88	89,710,525 59	1.5
10 Miscellaneous	2,461,289. 78	5,153,555 15	9,014,694 50	0 1
Total	380,008,893 96	3,850,150,078 56	5,407,580,251.81	94 1

From the above table it will be noted that in 1914 only the income tax, the taxes on spirits, beverages, and tobacco, and the excise taxes on corporations were in existence All the rest were war measures. The Federal income tax produced 69 2 per cent of all the revenue raised in 1920 It was fortunate that the income tax had already been put into operation and was in fair working order by the time the United States entered the War.

Federal Income Tax Laws. The United States had an income tax during the Civil War which was abandoned in 1870. In 1894 the effort was made to reintroduce an income tax, but this could not be accomplished because of constitutional limitations. The 16th Amendment as passed read, "Congress shall have power to lay and collect taxes on income, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration." Shortly after, the income tax law of 1913 was approved The rates included a normal tax of 1 per cent applied to the net income of individuals and corporations. The surtaxes levied on individuals began with a 1 per cent rate on a net income of $20,000 and rose to 6 per cent on the excess of incomes over $500,000. Personal exemptions of $3000 for a single person and $4000 for a married couple were allowed Corporations were allowed no exemptions. The outstanding features of the tax were: first, provision for collection at the source in order to prevent evasion, a method which gave great dissatisfaction and was abandoned in 1917 on the ground that it was unsuitable for a democratic country; secondly, permission for individuals' deducting only those losses incurred in trade; thirdly, definite limitations on the amounts which corporations could deduct for losses. The income tax law of 1913 was in effect until Dec. 31, 1915, when the income tax law of 1916 went into effect. There were two reasons for the new law: first, the customs duties had fallen off because of the decrease in the amount of goods coming from Europe; secondly, the old law needed to be clarified and changed in a number of instances

After the entry of the United States into the War, the income tax law of 1917 was passed and became effective as of Jan. 1, 1917. The new law was remarkable in two respects: first, the rates were higher than any country had ever imposed before; secondly, the act was exceedingly complex, because Congress had grafted the new law on the law of 1916 as an amendment. Both the normal and the surtax rates were increased. The normal rate imposed on individuals was 4 per cent, except on incomes between $1000 and $2000, on which the rate was 2 per cent. The normal rate on corporations was increased to 6 per cent. The surtax rates on incomes above $5000 rose progressively from 1 per cent to 63 on the excess of $2,000,000. The new law provided for "information at the source" The act specifically stated that income and excess profit taxes were not to be deducted, nor was interest on money borrowed for the purchase of tax-exempt securities. Dividends of corporations were to be taxed according to the rates obtaining in the year in which the profit or surplus was accumulated. The object of this provision was to make it impossible for corporations to refrain from declaring dividends in any one year in the hope that the rates of taxes would be lower in some future year. This provision was repealed in 1918 because of difficulties of administration.

In order to raise still greater amounts of revenue to meet the demands of the War, the income tax law of 1918 was framed and continued in force until the Revenue Act of 1921 became effective. The normal rates were again raised, both for individuals and corporations, becoming 12 per cent on taxable income both for individuals and corporations, with the exception of a rate of 6 per cent on the first $4000 of the taxable income of a citizen or a resident of the United States In 1919, the normal rate was reduced to 8 per cent, with 4 per cent on the first $4000 dollars of net income above the personal exemption. To obtain the total tax rate, the graduated surtax rates were added to the normal rate. The income tax law of 1918 smoothed out certain inequalities in the taxing of corporations

The Revenue Act of 1921. On January 1 the Revenue Act of 1921 went into effect, although some modifications were not put into force until a year later. These modifications included the abolition of the excess profits tax. One important change in the law of 1921 related to business losses; if the businessman

suffered a loss in one period, it was permissible, under this new law, to set off that loss against net incomes realized in the two succeeding years The income tax rate on corporations was raised from 10 per cent to 12½ The surtax rates for 1923 and for the first six months of 1924 were somewhat lower than those obtaining in 1921 and 1922.

Revenue Bill of 1924. Secretary Mellon proposed a new tax bill in 1924 which was submitted to Congress. The normal and surtax rates were to be reduced, the latter not to go beyond a maximum of 25 per cent. Counter-proposals were submitted, and as a result the Mellon Bill was greatly modified. The bill as modified was passed by both houses and finally signed by President Coolidge on June 2. It was known as the Revenue Bill of 1924. There was a general reduction of 25 per cent on incomes earned in 1923, payable in 1924. The new normal rates on net incomes (less credits) were 2 per cent on incomes less than $4000 and 4 per cent on incomes of $4000 and not more than $8000. Above $8000 the normal rate was 6 per cent The range of surtax rates was from 1 per cent on incomes between $10,000 and $14,000 to 40 per cent on incomes over $500,000. Heads of families with incomes of $5000 and over were permitted an exemption of $2500 instead of the old rate of $2000. Many excise taxes were repealed, including those on telegraph and telephone messages, candy, yachts and motor boats, carpets, rugs, trunks, purses, and drafts and promissory notes. Theatre tickets costing $ 50 or less were exempted. Taxes on automobiles selling for less than $1000 were exempted from the 3 per cent tax. The rates of estate taxes were increased to a maximum of 40 per cent on amounts of $10,000,000 and over. A new gift tax was imposed with the same rates as the estate tax in order to prevent evasion of the estate tax by the making of personal gifts. There was a new tax of 10 per cent on Mah Jongg sets, which was estimated to yield $2,000,000. The proposals which finally took shape in this revenue measure had been the subject of much discussion both in Congress and the press for several months. While the reduction of the tax on lower incomes was generally favored there was some criticism of the lower surtax scale applied to the higher incomes.

The War Profits and Excess Profits Tax. Provision was made in the Act of 1916 for the levy of a tax of 12½ per cent on the profits of the manufacture of munitions. In March, 1917, this tax was made a general war profits tax. In October of the same year this war profits tax was replaced by the excess profits tax. In the following year a law was provided under which the excess profits tax appeared in a new form as the war profits and excess profits tax. This law was applicable to corporations which had been organized for the sake of profit. The method adopted for arriving at the excess profits was to subtract from the total profits of the year the average rate of profits earned on the invested capital during the three years before the War began (1911–13), provided the rate of return had been as much as 7 per cent and not more than 9 per cent. Hence the base of the tax was the excess over an assumed normal profit. The law assumed that after allowance had been made for increases or decreases in working capital, an 8 per cent return on the amount of capital invested was fair in those industries in which the risk was not exceptional. The rates of the tax levied against the excesses were graduated from 20 per cent to 60 per cent. After the War was over, businessmen felt that this tax was too heavy to be borne, and it was given up at the end of 1921. Aside from its being a matter of history, the chief interest in the tax lies in the effort to determine what might be called a normal return on capital invested.

Capital Stock Tax of Corporations. The revenue act of 1918 provided for a tax on domestic and foreign corporations. In 1921, the act provided for a payment by every domestic corporation of a special excess tax with respect to carrying on business The corporation was obliged to pay $1 for each $1000 in excess of $5000 of the average value of the capital stock as it was during the preceding year. Foreign corporations were not allowed an exemption and had to pay at the same rate on all capital invested in the United States. This tax yielded a revenue of $95,000,000 in 1920.

Inheritance Taxes. These were provided for in the revenue act of 1916. They were to be levied on estates, after certain deductions had been made, and not on the shares of each heir In this law no distinction was drawn between direct and collateral heirs. If the estates were valued at less than $50,000, they were exempt The rates ranged from 1 per cent to 25 per cent on estates valued at $10,000,000 above the exemption. The law tried to provide against certain contingencies: (1) property which had been taxed once could not be retaxed within five years, so that if estates changed hands rapidly at the death of each successive owner, the property would not be largely consumed by taxes; (2) if property was proved to have been given away within two years before the death of the owner, the gifts were to be judged as made "in contemplation of death" and so were liable to the tax. It was difficult for the State to prove that such transfers of property were made in contemplation of death, and the courts consistently held that the burden of such proof rested on the State. The result was that the State did not often try to show that "transfers of property were in contemplation of death." The Federal inheritance tax yielded $103,635,000 in 1920, which was 1.8 per cent of the total revenue.

Taxation in States. The decade 1914–24 saw four noteworthy developments in State taxation. First, State taxes were increased; secondly, the income tax was increasingly used in different States; thirdly, State inheritance taxes grew; fourthly, returns from automobile taxes increased.

Increase in State Taxation. In 1910 the total receipts from State taxes were approximately $254,000,000. By 1915 this had increased to $352,000,000. In 1920 the grand total of State receipts from taxes was $692,000,000. A part of this great increase was due to the decline in the purchasing power of the dollar. Some part of the increase in 1920 was due to the War, but the Federal government bore the main burden of the war expenditures. Of the total revenue received by the States in 1920, the receipts from taxes comprised about 78 per cent. Of the total receipts from taxes, the general property tax yielded about 45 per cent. Business taxes, including taxes on corporations,

licenses, and insurance companies, yielded 23.3 per cent. Inheritance taxes yielded 8.6 per cent, and taxes on corporations, 8.1 per cent. Nonbusiness licenses yielded 9.1 of the total income from taxes. The yield from miscellaneous taxes was 5.9 per cent. Two important items of State expenditure are education and highways. In the table below the percentages of expenditure for these two items may be compared with the figures given above.

PERCENTAGE DISTRIBUTION OF EXPENDITURES, 1910–15–20

	1910	1915	1920
Total State Expenditure	100	100	100
Education	37 6	32.4	30.1
Highways	4.4	12.7	22 0
Other	58.0	54.9	47.9
Total State and local expenditure	100	100	100
Education	25.5	26 1	27.6
Highways	16.2	17 4	19 2
Other	58.3	56.5	53.2
Total local expenditure	100	100	100
Education	26.6	27 6	29.6
Highways	17.9	18.2	18.5
Other	55.5	54.2	51 9

It will be observed that the percentage of expenditure of the States for education in 1910 was much lower than that of 1920. The percentage spent on highways increased from 4.4 in 1910 to 22 in 1920. When we consider the combined expenditure of State and local governments, we find that the percentage spent for education increased, although not so rapidly as that for highways.

State Income Tax. The use of an income tax by States is not an innovation. Pennsylvania in 1840, Maryland in 1842, Massachusetts as a colony in 1692 and as a commonwealth in 1821, South Carolina in 1868, Georgia in 1863, and other States experimented with income taxes. Interest in this form of taxation was reawakened by its revival. The Wisconsin tax, which went into effect in 1911, has been the best-known. Massachusetts reintroduced the income tax in 1916. In 1919 four other States introduced the income tax, and in 1920 New York also put into effect a very thorough-going income tax law. The majority of the States which have adopted income taxes used progressive rates. There is no reason why the States should not use this form of taxation, provided the problems of double taxation can be definitely settled. The difficulty does not lie so much in the double taxation that exists in Federal and State income taxation, as in deciding the principles of levy. Shall the tax be levied on one who resides in one State but carries on business in another State in which the income tax exists? If the income tax exists in both States, should an individual be required to pay in both States? If the individual receives part of his income from business outside the State, shall he pay on all his income or only on that part which is earned within the State? Perhaps he may own shares of a corporation located in one State and place them in a safety deposit box in a different State from that in which he resides. Should he then be called on to pay taxes on the same income in three States? These questions reveal the difficulties of State income taxation. Much injustice is resulting because of a lack of comity between the various States. Very definite principles should be adopted which would apply to them all.

State Inheritance Tax. In 1919 State inheritance taxation yielded $45,770,000. This was 8.6 per cent of the whole yield from taxes. There has been an increase in the number of States using inheritance taxation. In 1890 only six States had inheritance taxation, and this was levied only on collateral heirs. The taxation of direct heirs came later. By 1900, 21 States had adopted such taxation; by 1910, 38 States; and by 1924 only Alabama and Florida were without inheritance taxes. Practically all the States levying a direct inheritance tax use the progressive principle Frequently the rates increase more rapidly with remoteness of relationship. Where the relationship is collateral, the exemptions are usually low. Where the relationship is direct, the exemptions are much higher.

Automobile Taxes. The returns to the States from the taxation of automobiles was rapidly becoming very important According to recent governmental statistics, there were in the United States about 12,500,000 motor vehicles, almost 11,000,000 private passenger cars, about 1,300,000 motor trucks and commercial cars, and 183,000 motorcycles. The returns for all States, from registration, approximated $150,000,000 Automobiles were also taxed in other ways than by registration licenses. In certain States and municipalities, individuals were taxed for licenses to drive for hire. In certain municipalities there was a set tax on automobiles for the upkeep of roads. A number of States had taxes on gasoline, and while this sort of tax bade fair to yield increasingly large sums, it must be borne in mind also that automobiles entail increasing expenditures for the upkeep of roads and the construction of new highways.

Municipal Taxation. More than one-third of the people of the United States live in cities of over 30,000 population. As cities grow in size, the per capita cost of rendering service increases, rather than decreases. The per capita cost payment of 146 cities in 1915 was $34 53. By 1919 this had increased to $35.58. Some of the important per capita items of expense for all cities in the United States for 1919 were: schools, $6.88; general governmental expense, $2.22; police department, $2.33; sanitation, $1.76; highways, $2.04. The cities obtained their revenue from a variety of sources. About two-thirds of the total revenue was derived from the general property tax. Of the amount derived from taxes, 91.3 per cent was derived from general and special property taxes; .2 per cent from poll taxes; and 8.5 per cent from nonbusiness taxes. During the decade 1914–24 certain reforms were organized in municipal finance. First, many cities established a budgetary system. The overloading of expenditures by different departments was avoided by establishing a central purchasing department for the city. In New York City the effort was made to avoid the duplication of records kept by different departments by centralizing the auditing and collecting departments under one control. Secondly, the cities issued large amounts of bonds. Many of them had great difficulty in meeting their interest and principal obligations when they fell due. Municipalities were encouraged to issue bonds during the period of high expenditures by their ability to issue tax-exempt bonds. The grand

total of obligations of this sort had become very great and was rapidly increasing.

The limitations which many cities put on their borrowing power do not seem sufficient protection against very heavy municipal indebtedness for future generations. The whole problem of municipal borrowing requires careful analysis and necessitates the formulation of principles of future municipal finance.

For taxation in other countries, see articles on those countries. See also FINANCE AND BANKING and TARIFF.

TAXONOMY. See ZOÖLOGY.

TAYLOR, HENRY CHARLES (1873–). An American agricultural economist, born at Stockport, Iowa, and educated at Drake University, Iowa State College, the University of Wisconsin, and abroad. In 1901 he was instructor in commerce at the University of Wisconsin and from 1908 to 1919 chairman of the department of agricultural economics. From 1919 to 1921 he was chief of the Office of Farm Management, in the United States Department of Agriculture, and in 1921–22, chief of the Bureau of Markets and Crop Estimates. He became chief of the Bureau of Agricultural Economics in 1922. He was the author of *Introduction to the Study of Agricultural Economics* (1905) *and Agricultural Economics* (1919).

TAYLOR, (JOSEPH) DEEMS (1885–). An American composer and critic, born in New York City. He received his musical education from O. Coon in New York. In 1916 he was war correspondent of the New York *Tribune* and from 1917 to 1921 associate editor of *Collier's Weekly.* In 1921 he succeeded James Huneker as music critic for the New York *World.* His compositions include a symphonic poem, *The Siren Song;* the choral works with orchestra, *The Chambered Nautilus* and *The Highwayman;* an orchestral suite, *Through the Looking-Glass;* and songs. He contributed a paper on music to *Civilization in the United States* (1921).

TCHEREPNIN, NIKOLAI NIKOLAIEVITCH (1873–). A Russian composer, born at Petrograd. He studied composition under Rimsky-Korsakov at the Conservatory there. In 1901 he became conductor of the Belaiev Symphony Concerts and professor at the Conservatory. His works consist of the ballets, *Armidas Pavillon, Narcissus,* and *The Masque of the Red Death* (after Poe); a symphonic poem, *Narcisse et Echo;* a prelude to Rostand's *La Princesse Lointaine;* a suite, *Le Jardin Enchanté; Scène dans la Caverne des Sorcières* (after *Macbeth*); *Fantaisie Dramatique; Gavotte; Poème Lyrique* for violin and orchestra; a piano concerto; a string quartet; several choral works with orchestra; choruses à cappella; piano pieces; songs, and duets.

TEACHERS' COLLEGE. See COLUMBIA UNIVERSITY.

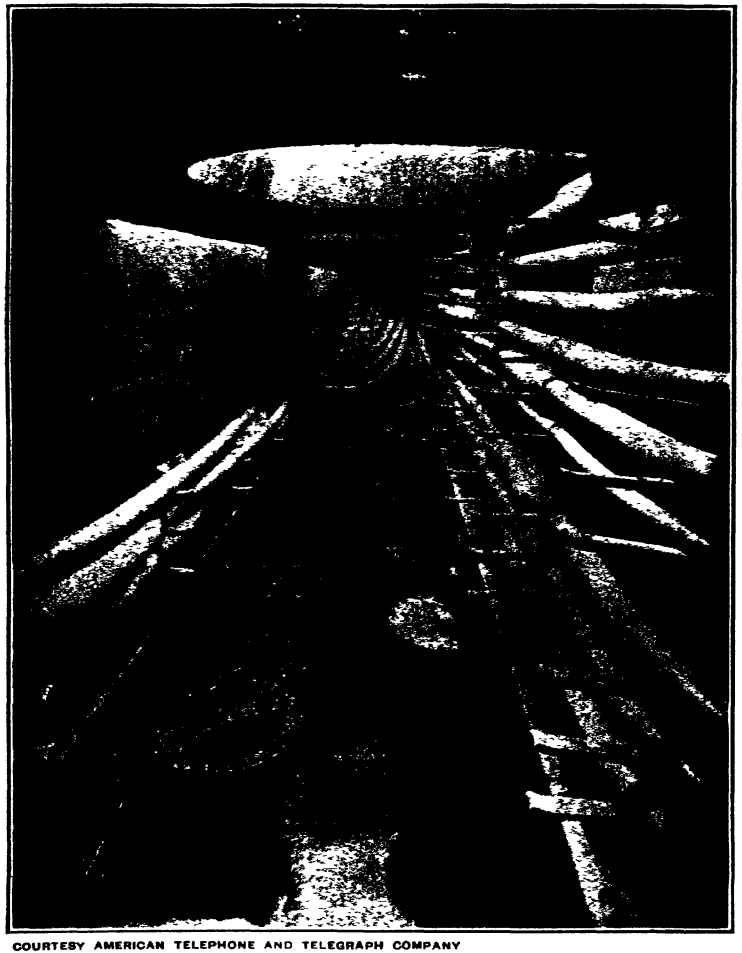
TEASDALE, SARA (MRS. ERNST B. FILSINGER) (1884–). An American poet, born at St. Louis, Mo., and privately educated. She spent several years in travel Her work has a charming lyric quality and fine rhythmic feeling. Her books include: *Sonnets to Duse and Other Poems* (1907); *Helen of Troy and Other Poems* (1911); *Rivers to the Sea* (1915); *Love Songs* (1917); *Flame and Shadow* (1920). She edited *The Answering Voice: One Hundred Love Lyrics by Women* (1917).

TEETH AND DISEASE. See RHEUMATISM, CHRONIC.

TELEGRAPHY. The War spurred the engineers of the telegraph companies to get as much service out of each line of wire as possible. To this end there was a notable development, both in quantity and quality, of printing telegraph systems and multiplex telegraph systems and the use of vacuum-tube repeaters During the War the United States Signal Corps installed a very elaborate telegraph system in France, in which the printing telegraph was very generally used. In 1920 the Western Union Company used printing telegraphs for 80 per cent of its trunk line traffic. Printing telegraph systems depend for their operation on the maintenance of absolute synchronism between two rotating elements at the respective ends of the line. This is obtained by special short impulses of current sent two or more times per revolution and by the use of tuning-forks. The printing systems in use in 1924 were of two types, "continuous synchronism" and "start-stop" In the former, as its name implies, the devices are in continuous operation In the latter the device is started for each letter. Sending is accomplished by a machine using a prepared tape which is made up on a machine operated like a typewriter. From 50 to 60 words per minute may be sent by one machine, and by using multiplex combined with printing, as many as 800 messages per hour may be transmitted over one wire. The messages are received ready for delivery and the frequency of errors is reduced.

It became a regular practice to use telephone circuits simultaneously for telegraph purposes. By the use of induction coils to choke out the high-frequency telephone currents and of condensers to stop the direct currents of the telegraph, these two types of currents may be sent over the same wire simultaneously and separated at the receiving end. A single pair of wires may serve for two telegraph circuits and one telephone circuit. By means of carrier currents the number of telephone conversations may be increased. In submarine cable telegraphy machine sending and receiving became the usual practice and the use of vacuum-tube repeaters and amplifiers made it possible to carry messages direct from one city terminus to another without manual repeating in between; thus there is direct connection between New York and London. Telephone, telegraph, and cable engineers united to standardize the terms, definitions, and phraseology of the entire art of communication, and this work was published by the American Institute of Electrical Engineers (1922). Consult McNicoll, *American Telegraph Practice,* and Kingsbury, *The Telegraph and Telephone Exchanges.* See RADIO TELEGRAPHY.

TELEPHONY. In 1917 there were in the United States 11,716,000 telephones connected to 21,175 central stations by 28,000,000 miles of wire. They were used in that year for 21,846,000,000 messages or at the rate of about six messages per day per telephone. In 1921 this had increased to 13,875,000 telephones, about 63 per cent of the total for the whole world. By Jan. 1, 1924, there was a further increase to more than 15,000,000 telephones in the United States and 35,000,000 miles of wire, of which 88 per cent was in the form of cables. Two-thirds of the cable was underground; one-third was aërial. The War was a great stimulus to



COURTESY AMERICAN TELEPHONE AND TELEGRAPH COMPANY

Interior View of Manhole in a City Conduit, showing Pots containing Loading Coils on Underground Cable



Loading Installation for Aerial Cable, showing Pots containing Loading Coils. View shows Harrisburg Pittsburgh Toll Cable

the art of communication because of its importance to the military forces of the nation. This had its effect not only in bringing into regular practical service devices such as the vacuum-tube repeater which were previously in an experimental stage, but in expediting coordination of available facilities and improving the reliability and capacity of existing systems. Before the United States' entrance into the War the vacuum-tube repeater (three-electrode thermionic tube) had been used in long-distance telephony, thereby making possible successful communication between New York and San Francisco (1916). To improve the reliability of the long-distance service and to prevent interruption by storms, most of the wires used in this service were combined into cables containing many pairs of wires, well insulated and protected, and strung on steel cables hung on the poles.

While good communication over long distances could be obtained over open-air lines by the use of repeaters, the introduction of cables called for a greater use of "loading coils." These are induction coils connected in series with each of a pair of wires at regular intervals in order to counteract the capacity of the wires, which in cables is great, and to increase the efficiency of transmission. Loading coils have been used since 1900, particularly for underground and submarine cables, but the more general use of cables since 1914 stimulated the development both of the quantity and quality of loading coils. New magnetic materials such as permalloy were developed for the core, and new forms such as powdered iron alloy came into use. For submarine cables permalloy tape is wound spirally around the wires to give continuous loading as distinguished from the "lumped loading" of coils The increase in the use of telephones in the large cities brought about the development of cables containing 1200 pairs of wires of #24 B & S gage in a cable having an outside diameter of two and five-eighths inches, including the lead armor. This is a means of increasing the capacity of the underground duct laid and standardized in size many years before. The insulation of these wires consists of very thin paper of a special character, having very low specific inductive capacity and low losses. Automatic telephone exchanges had been in service in isolated installations of moderate size for some years, but in the interval since 1920 their development and increased use was remarkable. The independent companies used them first in locations where the service was not very complicated, such as towns with one central station. In 1921 the Bell system installed its first automatic central in Omaha, and on Jan. 1, 1924, the Bell system had 30 such stations serving 185,000 subscribers in 17 cities. The earlier installations, by independent companies, were of the so-called step-by-step system, but these were largely superseded by the panel type system which became the standard of the Bell system.

The principal and outstanding features of the panel system include a device on the subscriber's instrument for transmitting a series of a definite number of successive impulses of urrent corresponding to the number of the party called. A line finder, at the central station called, is a selecter whose function is to find a terminal of a particular line on which a call originates out of a group with which it is associated, and to connect a "first selecter" and a "sender" to that line. A comparatively large number of subscribers' lines may be served by a comparatively small number of line finders. The line finder finds the calling line and connects the selecter and sender thereto. The "sender" switch receives the electrical impulses from a subscriber's dial on a decimal basis, stores them, and translates them to a nondecimal basis corresponding to the particular group of lines and trunks involved in the path of the call. The sender replaces the intelligence of the operator. The "selecter" switch, controlled by the sender, has the duty of selecting a particular group of trunks and one trunk of that group. It has the same function as the switchboard plug and cord, which in a manual station can be plugged by the operator into any one of a number of jacks which are the terminals of trunks or lines. There are "district selecters," "incoming selecters," and "final selecters" in the circuit, in the order named, from the calling line to the called line. The district selecter selects a trunk to the proper exchange, either the home or a distant exchange. The incoming selecter selects a trunk to the outgoing board of the same exchange. The final selecter selects the terminals of the line of the called party. The accompanying figure is an elementary diagram of the circuit and the principal devices in a circuit using the panel type of machine switching, from Morehouse, Graft, and Charlesworth, in the *Transactions* of the *American Institute of Electrical Engineers* (1923).

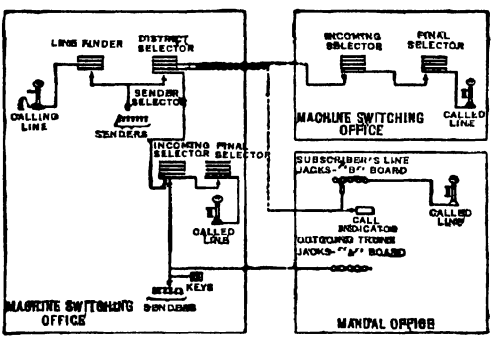


DIAGRAM SHOWING CONNECTIONS FROM MACHINE SWITCHING TO MACHINE SWITCHING, MACHINE SWITCHING TO MANUAL, AND MANUAL TO MACHINE SWITCHING

Carrier Current Telephony. This name was given to the method of transmitting telephone messages by means of modulated high-frequency currents, similar to radio currents but of a frequency of the order of 10,000 to 50,000 cycles and sent over a wire. By this means several telephone messages using carrier waves of different frequencies may be sent simultaneously over the same line and separated at the receiving end by suitable tuning devices such as are used in radio tuning. In 1919 Baltimore and Pittsburgh were connected by a cable using this scheme, which provides simultaneous service for five telephone messages and duplex telegraph service over one pair of wires. By means of rectifier (detecter) and amplifier tubes, these telephone messages may be sent on further on separate lines. Carrier current telephony in 1924 was being used to send telephone messages

over trolley wires and high-tension transmission lines without interfering with the usual service of the lines. In 1921 a telephone cable was put in service between Key West and Havana, a distance of 105 miles, the longest submarine telephone cable in service up to 1924. By means of carrier currents and multiplex telegraphy, several telephone and telegraph messages may be sent simultaneously, as described above. Messages from anywhere on the continent may be sent over this cable by direct connection

The subject of inductive interference has been of great interest to the telephone and telegraph engineers. It relates to the unfavorable effects which the large currents and high voltages of power transmission lines have on communication circuits These effects are threefold: electromagnetic, due to the large currents; electrostatic, due to the high voltages; and stray currents, due to grounds. This matter in 1924 was being given careful scientific study by a committee representing all concerned, with the expectation of devising regulations which would obviate the troubles and be fair to all concerned.

Public Address System. This is a development incidental to telephony and radio. Communication is made possible by the invention and improvement of amplifying tubes and powerful loud speakers. Its first notable demonstration was on Armistice Day in 1921, on the occasion of the address by President Harding at Arlington Cemetery. His voice was carried by telephone to New York and San Francisco, where it was amplified and broadcast by numerous powerful loud speakers to audiences of many thousands.

Photographs Transmitted by Wire. In 1924 the American Telephone and Telegraph Company gave the first public demonstration of sending photographs by wire between Cleveland and New York. This is accomplished by means of rotating cylinders at the respective ends of the line, held in exact synchronism by impulses of carrier currents At the sending end a transparent film picture is placed on the cylinder and a very fine beam of light is sent through the film and moved along the rotating cylinder in the manner used in talking-machines, moving one inch axially for 65 turns of the cylinder. The beam of light varies in intensity, depending on the opacity of the various portions of the picture through which it passes, and impinging on a photo-electric cell, it causes a corresponding variation in the intensity of the current transmitted to the distant end. There a film is set on the cylinder behind a slit on which a steady light is thrown. The slit is opened wide when a large current is transmitted and closes for a weak current. The light through the slit traces a spiral line on the film, thick or thin, depending on the intensity of the current received, which, when developed, gives the gradations of the original picture The general effect is that of a line engraving. A 5×7 picture is transmitted in 5 minutes, not including the time of development. Consult Jansky, *Principles of the Telephone;* Kingsbury, *The Telegraph and Telephone Exchanges;* Miller, *Telephone Practice;* Mitchell, *Principles and Practice of Telephony.* See TELEGRAPHY; RADIO TELEPHONY.

TEMPERATURE. See METEOROLOGY.

TEMPLE UNIVERSITY. A coeducational institution at Philadelphia, Pa., founded in 1884. The student enrollment increased from 3579 in 1915 to 9609 in 1923; the faculty increased likewise from 290 in the earlier year to 450 in latter, and the number of volumes in the library from 9200 to 25,615. In 1920, gifts and pledges were received to the amount of $300,000 for a new building. President, Russell H. Conwell, D.D., LL.D.

TENNANT, DAVID HILT (1873–). An American zoologist, born at Janesville, Wis., and educated at Olivet College and at Johns Hopkins University. He was lecturer in biology (1904–05), associate (1905–06), associate professor (1906–12), and professor (1912–) at Bryn Mawr College. Professor Tennant was a member of various expeditions of the Carnegie Institution to the West Indies, Australia, and Japan His published work was on the development of parasitic worms and experimental studies on hybridization of echinoderms.

TENNESSEE. Tennessee is the thirty-fourth State in size (42,022 square miles), and the nineteenth in population; capital, Nashville. The population increased from 2,184,789 in 1910 to 2,337,885 in 1920, a gain of 7 per cent. The white population increased from 1,711,432 to 1,885,993; the Negro population, on the other hand, decreased from 473,088 to 451,758 The native whites increased from 1,692,973 to 1,870,515, while the foreign-born population decreased from 18,459 to 15,478. The urban population of the State rose from 441,045 to 611,226; the rural decreased from 1,743,744 to 1,726,659. The growth of the principal cities was as follows: Memphis (q.v.), 131,105 in 1910 to 162,351 in 1920; Nashville (q.v.), 110,364 to 118,342; Knoxville, 36,346 to 77,818; Chattanooga, 44,604 to 57,895.

Agriculture. Tennessee is one of the minor cotton-producing States, and while the boll weevil invaded the southwestern part in 1921–22, its effects had not been very serious, the cold of winter serving largely to keep it in check. A comparison of acreage and production of cotton for several years is given below: in 1913, acreage 865,000, production 379,000 bales; 1915, 772,000, 303,000 bales; 1917; 882,000, 240 000 bales; 1920, 840,000, 325,000 bales; 1922, 1,007,000, 400,000 bales. The estimated production for 1923 was 340,000 bales.

While the population of the State increased 7 per cent in the decade, the number of farms increased only 2.7 per cent (from 246,012 in 1910 to 252,774 in 1920). The acreage of land in farms decreased from 20,041,657 to 19,510,856, or 2 6 per cent, but the improved land in farms increased from 10,890,484 to 11,185,302 acres, or 2.7 per cent. The value of all farm property apparently increased 104 4 per cent. or from $612,520,836 in 1910 to $1,251,964,585 in 1920; the average value per farm from $2490 to $4953. In interpreting these values, and all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the 252,774 farms in 1920, 148,082 were operated by owners, 807 by managers, and 103,885 by tenants. The corresponding figures for 1910 were 144,125, 826, and 101,061. White farmers in 1920 numbered 214,592, and colored farmers, 38,182. In 1910, the white farmers numbered 207,704; colored

farmers, 38,308. There was a decrease in colored population, 1910–20, amounting to 4.5 per cent, which affected the farm labor situation. Farms free from mortgage in 1920 numbered 105,128, and those under mortgage, 32,264; in 1910, 118,285 farms were free from mortgage and 24,006 mortgaged. Cattle in 1920 numbered 1,161,846, of which 669,360 were dairy cattle. In 1910 the cattle numbered 996,529; dairy cattle, 397,104. Sheep, in 1920, numbered 364,196, compared with 795,033 in 1910. Hogs had increased in number from 1,387,938 to 1,832,307. The estimated production of the principal farm products in 1923 was as follows: corn, 78,589,000 bushels; wheat, 4,508,000 bushels; oats, 4,345,000 bushels; potatoes, 2,728,000 bushels; sweet potatoes, 3,856,000 bushels; tobacco, 121,922,000 pounds; hay, 1,502,000 tons; peanuts, 1,066,000 bushels. Comparative figures, for 1913, are: corn, 68,675,000 bushels; wheat, 8,400,000; oats, 6,300,000; potatoes, 2,432,000; hay, 1,089,000 tons; and tobacco, 64,800,000 pounds.

Mining. The principal mineral products of the State are coal, cement, and clay products. During the decade 1914–24 the production of coal remained fairly constant, as will be noted in the following figures. 5,943,258 tons in 1914, valued at $6,776,573; 5,730,361 in 1915, $6,479,916; 6,137,449 in 1916, $7,522,445; 6,194,221 in 1917, $13,592,998; 6,831,048 in 1918, $19,305,203; 6,662,428 in 1920, $26,778,000; 4,460,326 in 1921, $14,932,000, 4,876,774 in 1922. The falling off in production in the last two years of the period was due chiefly to the coal miners' strike in 1921. It will be noted that while the production of coal remained practically constant during the decade, the value in the latter years greatly increased. This is due chiefly to conditions resulting from the scarcity of coal, and partly to the inflated condition of the currency. The copper output during the decade varied from 18,661,112 pounds smelted in 1914 to 14,556,278 in 1916, 15,053,568 in 1918; 16,727,803 in 1920; 14,226,232 in 1922. The total value of the mineral products of the State was $33,754,823 in 1921; $55,023,232 in 1920; $37,134,899 in 1919; $39,229,614 in 1918; and $19,647,145 in 1914.

Manufactures. The industrial development of Tennessee was rapid in later years. There were, in 1920, six cities with more than 10,000 inhabitants, and containing 19.2 per cent of the total population of the State These reported, in 1919, 56 7 per cent of the value of the State's manufactured products. In 1909 there were in the State 4609 establishments; 4775 in 1914; and 4589 in 1919. Persons engaged in manufacture numbered 87,672, 88,514, and 113,300; and the capital invested amounted to $167,923,784, $211,423,167, and $410,203,443, in those years. The value of manufactured products in 1909 was $180,216,548; in 1914, $212,071,489; and in 1919, $556,253,162. The large increase in value of products in 1914–19 was due largely to changes in industrial conditions brought about by the War, and cannot be properly used to measure the growth of manufactures during the period; but the increase in number of persons employed indicates clearly a decided growth in the manufacturing activities of the State.

Education. Tennessee has the same educational problems with which all the southern States are obliged to contend: a large rural population combined with a large colored population. Unusual attention was given to these problems in the decade 1913–23, and much progress was made, especially in the latter part of that period. In 1923, the Legislature passed a measure which reorganized to a large extent the school system. The Department of Education was created to supersede the Department of Public Instruction, and the head of the new department was called the Commissioner of Education rather than Superintendent of Public Instruction. The Legislature of 1921 passed a new county board of education law, under the provisions of which a county board of education consisting of seven members elected for a term of seven years, one member retiring each year, was created. The same Legislature enacted a measure extending the term of office of the county superintendent to four years instead of two years. High schools increased in number and efficiency during the period. They are under the control of the county board of education and operated under a special tax levied by the county, together with a State tax and a supplementary appropriation by the State. In 1923, there were 550 county high schools, 195 of them being standard four-year schools. The State system of elementary schools covers every county in the State. Since 72 per cent of the total enrollment in the public schools is in the rural elementary schools, this phase of the State's educational system presents the most important problem and is most difficult of solution. Educational agriculture was organized in the State in 1917–18. At that time there were courses in 12 schools with an enrollment of 189. This increased in 1923 to 64 schools with an enrollment of 1789. In 1913, the total enrollment in the county schools was 439,854 (371,948 white, 76,222 colored); while 69,399 white and 26,448 colored, a total of 95,487, were enrolled in the city schools. The total enrollment in the white schools in 1921 was 466,844; in the schools for colored pupils, 101,958, or a total enrollment of 568,802. The enrollment in the county elementary schools was 437,577; in the county high schools, 20,920; in the city elementary schools there were enrolled 131,225, and in the city high schools, 15,906. The total expenditure for schools in 1921 was $13,412,857. The percentage of illiteracy in the State decreased from 16.3 in 1910 to 12 6 in 1920: among the native white population from 11 9 to 9.2; among the Negro, from 33.3 to 23.9 per cent. In the foreign-born white population it increased from 8 2 per cent to 8.7.

Finance. For finance, see STATE FINANCES

Political and Other Events. The State political control for the most part during the decade 1914–24 remained Democratic. Governor Hooper, Republican, was renominated in 1914 but was defeated by the Democratic candidate, Thomas C. Rye. Important measures for regulating the sale of liquor, passed by the Legislature of 1913, went into effect on Mar. 1, 1914. In July, 1915, affairs of the city of Nashville went into the hands of a receiver, after the disappearance of 11 cash books of the city, covering the period 1908–12. The city treasurer was arrested, charged with misappropriation of municipal funds. The Grand Jury in June returned indictments against the finance commissioner, the comptroller, and the assistant city treasurer. The latter officer fled to Australia. In 1916 Governor Rye and Senator McKellar

were reëlected. In the presidential voting of this year, President Wilson received 152,955 votes, Charles E. Hughes, 116,257. A fire in Nashville, on Mar. 22, 1916, destroyed 600 buildings and caused a loss of more than $1,500,000 Thomas C. Rye was for a second time reëlected in 1918, and John K. Shields, Democrat, was reelected to the Senate. In 1918 A H. Roberts was elected governor on the Democratic ticket, but in 1920 he was defeated by Alf Taylor, Republican, brother of the late Senator and Gov. Robert L. Taylor. Gov. Alf Taylor served one term and was defeated by Austin Peay, Democrat. In the presidential voting of this year, W G Harding received 219,829 votes; J. M. Cox, 206,558. State control again passed to the Democrats in 1922 Senator McKellar was reëlected Governor Peay was inaugurated in January, 1923. He was renominated in August, 1924. In August, 1924, Senator Shields was beaten for renomination by Gen. L. D Tyson, a Spanish-American War and World War veteran, who commanded a brigade in the 30th Division

Legislation. The most important acts of the Legislature in the decade 1914-24 are indicated below. The Legislature of 1915 passed several measures designed to bring about stricter enforcement of the prohibition law. In 1917 provision was made for a budget system and for a compulsory system of party primary elections. A general prohibition law was also passed, and the insurance laws were amended in important details. The laws relating to health were also amended. The Legislature of 1919 abolished the death penalty for murder in the first degree. By a provision of this Legislature, women were permitted to vote in presidential elections A State police force was created, and a workmen's compensation law was passed. The Legislature of 1923 passed a measure drafted by Governor Peay for the consolidation of the State's activities into a small number of executive departments answerable directly to the governor. This resulted in the reorganization of the government under nine departments, each under an executive officer appointed by the governor, thus centralizing power and responsibility.

TENNESSEE, UNIVERSITY OF. A nonsectarian, coeducational institution at Knoxville, Tenn., founded in 1794. The Colleges of Medicine and of Dentistry and the School of Pharmacy are at Memphis, Tenn The university increased its student enrollment from approximately 1200 in 1916 to 1821 in 1923-24, plus 1019 in the summer of 1923, and increased its faculty in the same period from about 200 to 271 members and the library from 40,000 to 70,000 volumes In 1917, the State Legislature authorized a bond issue of $1,000,000 for new buildings and improvements, and the levy of a half mill tax for the support of the institution. Harcourt A. Morgan, B.S.A., LL.D, succeeded Brown Ayres, Ph.D., LL.D., as president in 1919.

TENNIS. The growth in the popularity of tennis has been phenomenal and world-wide during the decade ending with 1924. If baseball be entitled to be called America's national game, tennis deserves even more the appellation of the "international game" The competition for the Davis Cup, emblematic of the world's championship, now attracts annually entries from a score of countries, whereas in former years the United States, various divisions of the British Empire and France, alone strove for possession of this trophy. But this fact in itself gives only a faint indication of the wide appeal tennis is making. National tourneys, sectional tourneys, intercity matches, college and school tourneys and thousands upon thousands of club tourneys are held each season practically the world over.

The United States recovered its laurels as the premier tennis nation in 1920 when a team consisting of William T Tilden II and William M. Johnston journeyed to New Zealand and recaptured the Davis Cup by defeating the Australasian defenders, Norman E. Brookes and Gerald L. Patterson. The United States, with Tilden and Johnston again bearing the brunt of the burden, successfully defended the trophy in 1921, 1922 and 1923. The recently offered Wightman Cup, an international trophy for women players, also was won in 1923 by an American team consisting of Mrs. Molla Bjurstedt Mallory, Miss Helen Wills, Miss Eleanor Goss and Mrs Hazel Hotchkiss Wightman playing against an English team comprising Miss Kathleen McKane, Mrs B C Covell, Mrs. Geraldine Beamish, and Mrs R C Clayton. Mlle. Suzanne Lenglen of France, however, has stood out for several years as the cleverest woman tennis player, easily overcoming the strongest opponents the United States and Great Britain could produce.

The United States Lawn Tennis Association, the governing body of amateur tennis in America, enacted a rule in 1924 barring from competition any player who contributed articles on the sport to the press or magazines. This so-called player-writer rule bars such stars of the game as William Tilden II and Vincent Richards and has given rise to somewhat bitter controversy It was provided that this rule should not go into effect until 1925, but Tilden soon after its enactment resigned as a member of the Davis Cup team Richards also tendered his resignation but later withdrew it.

Court tennis, racquets and squash, all in a sense allied to lawn or turf tennis, have profited by the advance made by the last named sport and are played more generally than ever before. It is to the more exclusive clubs, however, that their popularity is chiefly confined. In court tennis, Jay Gould of the United States, after long reigning supreme, met defeat in 1923 at the hands of E. M. Baerlein of England in the play for the Bathurst Cup in France. George F. Covey of England retained the world's professional court tennis title in 1923 by defeating Walter Kinsella of the United States Jock Soutar of the United States remains as the world's professional racquets champion. See OLYMPIC GAMES.

TERAUCHI, MARSHAL. See JAPAN, *History.*

TERMAN, LEWIS MADISON (1877–). An American psychologist, born in Johnson County, Ind., and educated at Clark University. He became a high school principal in Smith's Valley, Ind., in 1898. After teaching in the California State Normal School in Los Angeles he went to Stanford University and became professor of education there in 1916. During the War he acted as major in the division of psychology in the Surgeon-General's office in Washington. He was also a member of a board of five psychologists appointed to revise the army mental test methods for use in schools.

TESCHEN, ZIPS, AND ORAVA QUESTIONS. The disposition of these three districts, the first up to 1918 part of Austria and the second and third of Hungray, occasioned a serious dispute between Poland and Czecho-Slovakia. The Duchy of Teschen, though embracing only an area of 2282 square kilometers, but possessing great mineral wealth of coking and gas coal, and situated on the more important road and railway arteries of Central Europe, occupied a place of first rank. In 1910 there were settled here 233,850 Poles, 115,604 Czechs, and 76,916 Germans. It is important to note that the Polish settlements, largely in the mining areas, dated back only to the last half of the nineteenth century and were made up of immigrants from Western Galicia Poles were in the majority in the centre and east; in the west the Czechs were most numerous; while the Germans were settled in the towns (Bielitz, Teschen, etc), and formed the middle class. Ethnical considerations were therefore far from simple; the problem was further complicated by the economic importance of the duchy It forms part of the vast Silesian coal field, and here were mined in 1913 7,594,865 tons of coal and 1,146,580 tons of coke. Such was the basis of the protracted struggle for possession before the Peace Conference, and after. On the grounds of history and economic necessity (Karvin coal supported the great Czech iron and chemical industries at Witkowitz, Moravska, Ostrava, etc., while the Oderberg-Jablunka railway was vitally necessary for the maintenance of communications between Slovakia and the West), the Czecho-Slovaks could make out a convincing case. The Poles, on the other hand, supported their claims on ethnical grounds, although these were disputed, as the Polish population was relatively unstable. Other considerations had, however, entered into the controversy. On the collapse of Austria in October, 1918, two local Silesian organizations took possession of the duchy and effected a common administration On Nov. 5, 1918, control was divided between the two, the Czechs establishing themselves in the smaller western portion east of Freistadt, and the Poles in the remainder. In January, 1919, against Czecho-Slovak protests, Polish troops occupied eastern Teschen. The Czechs, on their side, took Oderberg after a skirmish; an armistice on February 5 laid down a new line more favorable to Czecho-Slovakia this time. In view of all these complications and the inability of an Inter-Allied Commission, at work on the spot, to suggest a solution, the Peace Conference finally decided to permit the two governments to settle the question between themselves. As they were unable to do this, the Supreme Council, on Sept 27, 1919, ordered plebiscites in the whole duchy as well as in Zips and Orava. By this time the contested region was filled with soldiers, customs officials, and a general ill will. The tension increased, aided by hostile propaganda in both countries, with the result that rioting and strikes grew in frequency. Amid such a state of affairs the holding of the plebiscite was found impracticable and the Inter-Allied Commission so reported to the Supreme Council (July, 1920). An appeal to the contesting powers again revealed a deadlock. This time, in the interests of European peace, the Supreme Council called upon the Council of Ambassadors to effect a settlement (July 11, 1920). On July 28, in accordance with the decision of the Supreme Council, the Council of Ambassadors announced its findings for Teschen, Zips, and Orava. The boundary as finally laid down gave Czecho-Slovakia the Oderberg-Jablunka line and all territory west of it, including the mines of Ostrau-Karvin and the city of Freistadt. The town of Teschen was to remain with Poland, which also acquired the German enclave of Bielitz in the midst of a rich agricultural region. The necessity for dividing a region that was economically and culturally a unit was unfortunate but the nationalistic fevers awakened by the War made any other solution impossible. The contest was not finally closed until December, 1923, when, on the appeal of Poland, the Permanent Court of International Justice reviewed the proceedings and pronounced in favor of the boundary line of July 28, 1920.

Involved in the same controversy was the disposition of the counties of Zips and Orava (formerly of Hungary). Northwest Zips and northeast Orava were claimed by Poland on historical and ethnical grounds. In 1910, there were in Orava 2000 Magyars, 1528 Germans, 59,096 Slovaks, and 16,120 "others" (the Magyar way of referring to Poles); in Zips there were 18,658 Magyars, 38,432 Germans, 97,077 Slovaks, 12,327 Ruthenes, and 5629 "others." Both countries were occupied by Czecho-Slovakia in November, 1918, on the ground that the inhabitants of the highlands were not ethnically Polish; but the difficulties attending the Teschen solution prevented a settlement here The decision of the Council of Ambassadors of July 28, 1920, gave Poland northeastern Orava with the line of demarcation south of the main Carpathian divide, and northwestern Zips with the line north of the divide. Economically the partition seemed justified because of the close connection between the frontier villages and Galicia, but on ethnical grounds there appeared more reason for entire union with Czecho-Slovakia.

TEWFIK, AHMED. PASHA (1843–). Turkish statesman, born at Constantinople. From 1859 to 1870 he served in the Turkish army, resigning in the latter year to enter the translation bureau of the government. During the Russo-Turkish War he acted as political agent for the army and later became Turkish minister at Athens. In 1884 he was ambassador at Berlin, and was recalled in 1895 to be minister of foreign affairs in his home government. He was Grand Vizier in 1909, again in 1912, and for the third time in 1918. The government which he formed in 1918 excluded all the members of the Committee of Union and Progress. He resigned in March, 1919, but again assumed charge of the government in October, 1920, and retained it until November, 1922, when the Sultan, Mohammed VI, abdicated. On the break-up of the old régime at Constantinople, he fled to Egypt.

TEXAS. Texas is the first State in size (265,896 square miles), and the fifth in population; capital, Austin. The population increased from 3,896,542 in 1910 to 4,663,228 in 1920, a gain of 19.7 per cent. The white population increased from 3,204,848 to 3,918,165; Negro, from 690,049 to 741,694; native white, from 2,964,864 to 3,557,646; and foreign-born white, from 239,984 to 360,519. Both urban and rural populations mounted, the former from 938,104 to 1,512,689; the latter from 2,958,438 to 3,150,539. The growth of the principal cities

was as follows: San Antonio (q.v.), 96,614 in 1910, 161,379 in 1920; Dallas (q.v), 92,104, and 158,976; Houston (q.v.), 78,800, and 138,276; Fort Worth (q.v.), 73,312, and 106,482; and Galveston, 36,981, and 44,255.

Agriculture. As Texas is one of the chief cotton-producing States, agricultural conditions were early affected by the ravages of the boll weevil, which made its first appearance in that State in the nineties. The insect continued to spread over the State where cotton is grown, but although the yield of cotton fell considerably during several years, especially in 1918–21, for the most part the production was comparatively constant except in occasional years when climatic conditions favored the weevil. This will be noted from a comparison of the acreage and production for several years: in 1913, 12,597,000 acres, 3,945,000 bales; 1915, 10,510,000 acres, 3,227,000 bales; 1918, 11,233,000 acres, 2,697,000 bales; 1920, 11,898,000 acres, 4,345,000 bales, 1921, 10,745,000 acres, 2,198,000 bales; 1922, 12,125,000 acres, 3,290,000 bales. The estimated production in 1923 was 4,168,000 bales.

While the population of the State increased 19.7 per cent in the decade, the number of farms increased only 4.4 per cent (from 417,770 in 1910 to 436,033 in 1920); the acreage of land in farms from 112,435,067 to 114,020,621, or 1.4 per cent, and the improved land in farms from 27,360,666 to 31,227,503 acres, or 14.1 per cent The value of farm property showed an apparent increase of 100.5 per cent, from $2,218,645,164 in 1910 to $4,447,420,321 in 1920, the average value per farm, from $5311 to $10,200. In interpreting these values and all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the 436,033 farms in 1920, 201,210 were operated by owners, 2514 by managers, and 232,309 by tenants. The corresponding figures for 1910 were 195,863, 2332, and 219,575. White farmers in 1920 numbered 357,249 and colored farmers 78,784. In 1910 white farmers numbered 347,852, and colored farmers, 69,918 Farms free from mortgage in 1920 numbered 105,490; those under mortgage, 69,940. In 1910, farms free from mortgage numbered 128,082; those mortgaged, 64,008 The total number of cattle in 1920 was 6,156,715, of which 1,463,707 were dairy cattle. In 1910 cattle numbered 6,934,586; 1,013,867 dairy cattle. Sheep in 1920 numbered 2,573,485, compared with 1,808,709; hogs, 2,225,558, compared with 2,336,363. The estimated production of the principal farm products in 1923 was as follows: corn, 85,907,000 bushels; wheat, 16,370,000 bushels; oats, 51,119,000 bushels; barley, 3,346,000 bushels; potatoes, 1,789,000 bushels: sweet potatoes, 5,322,000 bushels; hay, 617,000 tons; rice, 5,143,000 bushels, and peanuts, 81,766,000 bushels. Comparative figures for 1913 are: corn, 163,200,000 bushels; wheat, 13,650,000; oats, 32,500,000; barley, 168,000; rice, 9,696,000; potatoes, 2,340,000; and hay, 464,000 tons.

Mining. Through the remarkable development of the oil fields of the State, Texas has become in recent years one of the most important of the mineral-producing States in the value of its products. In 1921 it ranked seventh. Petroleum production in the decade 1914–24 was as follows: 20,068,184 barrels in 1914, valued at $14,942,848; 24,942,701 in 1915, $13,026,925; 27,644,605 in 1916, $25,760,335; 32,413,287 in 1917, $42,891,555; 38,750,031 in 1918, $74,867,537; 96,868,000 in 1920, $313,781,000; 106,166,000 in 1921, $162,663,000; 118,684,000 in 1922. The great increase in production in the last years of the decade resulted from the development of important new petroleum fields. The increased value in the two years 1922–23, while due largely to the increase in the output, reflects also the decreased purchasing power of money resulting from inflation, with consequent higher prices. The output of natural gas is very valuable. In 1914 this amounted to 13,433,639 M cubic feet, valued at $2,469,770; 1916, 15,809,579, $3,143,871; 1918, 13,439,624, $5,027,449, 1920, 37,063,000, $7,042,000; 1921, 44,504,000, $8,893,000. Natural-gas gasoline after 1916 became an important product. In that year the output was 1,292,811 gallons; in 1918, it was 7,326,122 gallons; 1920, 32,956,028; 1921, 77,141,201. The State also produces sulphur, cement, clay products, a small quantity of iron ore, gypsum, and other minerals. The total value of the mineral production in 1921 was $212,141,250, compared with $371,250,979 in 1920; $190,563,015 in 1919; $110,306,367 in 1918; and $30,363,426 in 1914.

Manufactures. Texas has increased greatly in importance as an industrial State, especially in the period 1914–19, when the petroleum refining industry increased to an extraordinary extent. There were, in 1920, 29 cities having more than 10,000 inhabitants. These formed 23.4 per cent of the State's population, and produced 40 8 per cent of the value of the State's manufactured products. There were in the State 4588 manufacturing establishments in 1909; 5084 in 1914; and 5724 in 1919. Persons engaged in manufacture numbered 84,575, 91,114, and 130,911; and the capital invested amounted to $216,875,579, $283,543,820, and $585,770,451 in those years. The value of products in 1909 amounted to $272,895,635; in 1914, to $361,279,303; and in 1919, to $999,995,796. The large increase in value of products was due chiefly to changes in industrial conditions effected by the War, and cannot be used to measure the growth of manufactures between the industrial censuses of 1914 and 1919; but the increase in number of persons engaged in manufacture clearly indicates a decided growth in the manufacturing activities of the State The refining of petroleum is the first industry in point of value of product. As this industry did not develop to any extent till after 1914, the only available figures are those of 1919, in which year the product amounted to $241,757,000 in value. Slaughtering and meat packing is second in importance, with a value of $42,530,000 in 1909; $52,990,000 in 1914; and $125,364,000 in 1919. The manufacture of cotton-seed oil and cake is third, with $29,916,000 in 1909; $41,945,000 in 1914; and $102,112,000 in 1919. Flour-mill and gristmill products, in fourth place, amounted to $32,485,000 in 1909; $35,110,000 in 1914; and $73,064,000 in 1919.

Education. The chief educational problems of Texas come from its great expanse and widely scattered population. The decade 1913–23 saw continuous progress in their solution. The Legislature at its various sessions passed many laws which resulted in improved conditions:

for one, the Better Class Amendment to the State Constitution, passed in 1918, which removed all limit on the rate of local tax which a district may vote for support of its schools. Numerous campaigns for education carried on during this period aroused the entire State to greater interest in all the schools, and particularly in the rural schools. The salaries of public school teachers were increased on an average of 54 per cent during the decade; and with this increase came improvement of the qualifications of teachers. With better support, the schools increased the length of their terms. Many improvements were made in rural schools, especially in the direction of consolidation and the transportation of pupils. Considerable advance was made in vocational education under the Smith-Hughes Law which gives Federal aid to States. A system of free textbooks was introduced, approved and established; and a plan of classifying and affiliating elementary schools was initiated. A campaign was waged for the passage of a law providing for the establishment of a county unit system of managing schools. Schools for Negroes and Mexicans were greatly improved. Recognition for the work of women on equal terms with that of men progressed. The enrollment in the public schools in 1909–10 was 821,631; in the elementary schools in 1921–22 it was 1,048,619, and in the high schools, 163,178. The expenditures for the support of schools in 1922 was $38,356,046. The percentage of illiteracy in the State decreased from 11.6 in 1910 to 9.6 in 1920: in the native white population, from 3.7 to 2.5; among the Negro, from 31.4 to 23.4. In the foreign-born white population it increased from 28 per cent to 33.3

Finance. For finance, see STATE FINANCES.

Political Events. The State remained overwhelmingly Democratic in the decade 1914–24, although as usual the party was divided by factions. The Ku Klux Klan acquired great strength in 1922 and took an important part in deciding elections of State and other officials, but its power waned considerably in 1924. In 1914, James E. Ferguson was elected governor. At this election an amendment to the constitution providing for the initiative and referendum was defeated. Governor Ferguson was reelected in 1916, and Senator Culberson was reelected. In the presidential voting of this year, Wilson received 285,909; Charles E. Hughes, 69,949. In August, 1917, impeachment charges were filed against Governor Ferguson for alleged misappropriation of public funds. The charges were made by the Speaker of the House, and on August 23 the House voted for the impeachment of the Governor on 21 different counts Trial began in the Senate on Aug. 30, 1917, and on Sept. 25, 1917, that body removed the Governor from office and disqualified him from further holding any office in the State. He had resigned a few hours before. Of the 21 charges, 10 were sustained; nearly all these related to the misuse of trust funds and public money. The Governor denied all these charges and ran for the governorship again in 1918. He was defeated by the former Lieutenant-Governor, W. P. Hobby, who had succeeded him at the close of the impeachment proceedings. Morris Sheppard was reëlected to the United States Senate in 1918. Ferguson was a candidate for the United States presidency on a so-called American ticket. Pat M. Neff was elected governor. In a nominating primary for United States Senator in 1922, Earl B. Mayfield and James E. Ferguson won in the first primaries over Senator Culberson. In the run-off primary, Mayfield was nominated, and in November he was elected. Governor Neff was also reelected. The Ku Klux Klan developed great strength in the State, and it was alleged that Senator Mayfield was nominated largely as a result of its support, the anti-Klan vote scattering among a number of other candidates. Charges of excessive expenditures in his election were filed with the Committee on Elections in the Senate. These charges were still pending, Aug. 12, 1924. In the presidential convention held in May, 1924, William G. McAdoo of California received the indorsement for president.

Legislation. The most important acts of the Legislature in the decade 1914-24 are noted below. A resolution for a constitutional amendment providing for woman suffrage was defeated in the House by a vote of 90 to 32. The Legislature of 1919 submitted to the people the question of holding a constitutional convention It also submitted a constitutional amendment for woman suffrage. Both were defeated. In 1921 the Legislature passed an amendment forbidding Japanese and Chinese to hold land in Texas except under certain conditions It also passed an amendment designing to make more effective the provisions of the existing law in respect to the conservation of the State's natural resources, and provided for the organization of coöperative marketing associations. It also proposed a constitutional amendment restricting the suffrage to native-born or naturalized citizens and authorized absentee voting in primary elections. The commission form of government was extended to towns with less than 5000 population, and a constitutional amendment was adopted increasing the amount of the pensions paid to Confederate soldiers and sailors and their widows. The Legislature of 1923 enacted a measure substituting electrocution for hanging in capital punishment. It amended the prohibition law so as to make it more stringent in its provisions and passed an enabling act providing an increase in pensions for Confederate veterans.

TEXAS, UNIVERSITY OF. A coeducational State institution founded in 1881 The main university is at Austin, the medical branch at Galveston, and the College of Mines and Metallurgy at El Paso The student enrollment increased from 2576 in 1914 to 3235 in 1918; 4571 in 1920; and 5100 in 1923–24, with 3145 in the summer session of 1923. The faculty was increased during the decade from 191 to 354, the library from 110,000 bound volumes and 30,000 pamphlets to 237,682 volumes and 49,349 pamphlets. The productive funds of the university aggregated $10,856,372.02 in 1924. The Genaro García collection of materials in the Latin American field was secured in 1921 at a cost of $104,539. The department of journalism was opened in 1914; the department of library science in 1918; and the School of Business Administration, which in 1912–13 was organized as a department of the College of Arts and Sciences, became a separate school in 1922–23. The College of Mines and Metallurgy was created in 1919, following the passage of an act by the State Legislature constituting the State School of Mines and Metallurgy a branch of

the University of Texas. Robert E. Vinson, D.D., LL.D., became president in 1916, upon the resignation of Sidney E. Mezes, who accepted the presidency of the College of the City of New York. In 1923, President Vinson resigned to accept the presidency of Western Reserve University, Cleveland, and William S. Sutton, M.A., LL.D., dean of the School of Education, was appointed acting president.

TEXAS FEVER. See VETERINARY MEDICINE.

TEXTILE MANUFACTURING. The American textile industry in 1921, according to the United States Census, ranked second among the various manufacturing industries of the country when considered on the basis of the total value of the product. This value was represented by the vast amount of $6,960,927,643, which was the output of 26,039 establishments with an average number of wage earners of 1,510,875. In this total production textile fabrics and materials aggregated $3,896,448,661, articles from textile fabrics for personal wear $2,710,656,748, and other textile fabrics $353,822,234. It must be realized, however, that 1921 was a year of some depression in the textile industry though it manifested signs of a recovery from the serious setback which had begun in the spring of 1920 and continued through that year. In 1919, a year of abnormal activity, the value of the product was $9,216,102,814, representing the output of 28,552 establishments with an average number of wage earners of 1,611,309. Both years, however, represented a gain over 1914 when 23,483 establishments with 1,061,058 wage earners had a production valued at $3,447,997,219.

The textile industry in the United States is ordinarily divided into five principal groups, as follows: cotton manufactures, wool manufactures, knit goods, silk manufactures, and cordage and twine, jute and linen goods, this ranking being made on the basis of the value of their products.

In all of these various lines there had been activity in the decade between 1914 and 1924 and this is indicated by Table I, which shows the new textile mill construction for the 10-year period. It must be remembered that usually the new mills were large affairs, as modern conditions of profitable operation called for large units.

Cotton Manufactures. Cotton goods, cotton small wares, and cotton lace goods form the most important branch of the American textile industry. Of these three the manufacture of cotton goods naturally is by far the most important as cotton small wares and lace goods form a comparatively small portion of the total output. The cotton-goods manufacturing industry includes mills engaged in the preliminary processes preparatory to spinning, in spinning, and in the weaving of piece goods. The number of establishments, persons engaged, amount of wage, cost of material, and the value of the total product are shown in Table II.

TABLE II—COTTON-GOODS INDUSTRY IN THE UNITED STATES [a]

Years	Number of establishments [b]	Persons engaged	Salaries and wages	Cost of materials	Value added by manufacture [c]	Value of products
1914	1,168	338,726	$161,680,000	$431,603,000	$244,966,000	$676,569,000
1919	1,278	445,423	392,839,000	1,277,786,000	847,486,000	2,125,272,000
1921	1,328	425,319	364,182,000	707,442,000	570,779,000	1,278,221,000

[a] From the Bureau of the Census report on the cotton-goods industry, 1921.
[b] Statistics for establishments with products valued at less than $5000 are not included in the figures for 1921; there were 10 establishments of this class which reported 8 wage earners and products valued at $22,600. For 1919, however, data for 10 such establishments, reporting 20 wage earners and products valued at $26,000, and for 1914 data for 11 such establishments, reporting 18 wage earners and products valued at $23,000, are included in the figures with the exception of the item "Number of establishments."
[c] Value of products less cost of materials.

In 1923, the United States had approximately 24 per cent of the world's total of cotton spindles (see Table III on page 1288). The cotton-goods industry is confined principally to the New England and South Atlantic States, with a few mills scattered through the Middle West The centres of the greatest activity are Bristol County, Mass., with 7,702,569 spindles, and Gaston County, N. C., with 901,492 spindles. Table IV gives the distribution of the industry according to the number of spindles for the 10 leading States.

At the end of 1923 the total number of cotton spindles in the southern States was 17,163,599 as compared with 13,478,297 in 1914, the average annual increase being 446,791. Southern cotton mills, with still less than half the spindles in America, however, were consuming considerably more than half the cotton manufactured in the country.

The increased spindleage and greater efficiency of cotton mills in the United States enabled that country as regards the consumption of cotton to maintain a higher level than in prewar years, as compared with other nations where there was a great falling off in consumption, in the United Kingdom and continental Europe Notwithstanding strikes in the New England cotton mills in 1922, the consumption of cotton increased over the previous year in the United States by 12.6 per cent. In 1913, the United Kingdom in its manufactures used more than 4,500,000 bales and the Continent approximately 7,500,000 bales; in 1922, they took, respectively, but 2,900,000 and 4,800,000 bales. On the other hand, the Far East was increasing its proportion of the world total. The actual and relative consumption of all kinds of

TABLE I—COMPARISON OF NEW TEXTILE MILL CONSTRUCTION IN THE UNITED STATES [a]

	1923	1922	1921	1920	1919	1918	1917	1916	1915	1914	1913
Cotton	74	57	46	89	74	29	52	51	24	26	27
Wool	38	34	36	30	54	24	24	23	19	21	24
Knitting	73	94	103	59	84	120	97	113	111	110	142
Silk	26	24	31	71	61	49	86	60	25	51	54
Miscellaneous	21	29	26	15	16	27	38	33	40	37	30
	232	238	242	264	289	254	297	280	219	245	277

[a] From *Textile World* (New York).

TABLE III—WORLD'S COTTON SPINDLEAGE, 1913 AND 1923

Country	Aug. 31, 1913 Spindles: Total active	Per cent mule	Per cent ring	Consumption per 1,000	July 31, 1923 Spindles: Total active	Per cent mule	Per cent ring	Consumption per 1,000
	000's				000's			
Great Britain	55,653	81	19	77	56,583	78	22	49
Per cent of world's total	39	...	...	...	36	...	...	...
France	7,400	54	46	137	9,600	44	56	126
Germany	11,186	46	54	158	9,382	46	54	108
Russia	9,213	41	59	272	7,246	40	60	271
Poland		Included under Russia			1,200	39	61	190
Finland					241	26	74	134
Italy	4,600	25	75	172	4,570	18	82	196
Austria	4,909	51	49	171	1,023	51	49	107
Czecho-Slovakia	Included under Austria				3,508	52	48	71
Spain	2,000	40	60	179	1,813	34	66	194
Belgium	1,492	33	67	172	1,683	28	72	162
Switzerland	1,398	82	18	70	1,513	56	44	49
Sweden	534	27	73	216	566	18	82	148
Holland	479	41	59	177	669	32	68	166
Portugal	480	27	73	164	487	34	66	177
Denmark	90	16	84	285	97	13	87	296
Norway	75	28	72	154	66	20	80	114
Total continent	43,856	..	...	...	43,664	...	...	.
Per cent of world's total	30	...	...	...	28	...	...	..
India	6,084	28	72	358	7,331	16	84	307
China	Included under sundries				2,680	...	100	600
Japan	2,300	2	98	691	4,877	1	99	535
Total Asia	8,384	...			14,888	...	...	..
Per cent of world's total	6	..	...	...	9	...	...	..
United States of America	31,505	13	87	184	37,397	6	96	194
Per cent of world's total	22	..	..	...	24	.	...	...
Canada	855	45	55	133	1,076	43	57	164
Mexico	700	...	...	227	770	1	99	177
Brazil	1,200	...	...	424	1,700	...	100	396
Sundries	1,300	.	...	?	275	...	100	312
Grand total	143,453	49 5	50 5	156	156,353	42	58	145

TABLE IV—TOTAL COTTON SPINDLES IN THE UNITED STATES AND IN THE TEN LEADING STATES [a]
(In thousands)

States	Cotton years ending July 31— 1913	1919	1920	1921	1922
Massachusetts	11,076	11,630	11,759	11,811	11,923
South Carolina	4 536	4,956	1,974	5,014	5,090
North Carolina	3,594	4,789	4,955	5,228	5,293
Rhode Island	2,533	2,678	2,676	2 806	2,829
Georgia	2,103	2,518	2,542	2,648	2,679
New Hampshire	1,469	1,444	1,444	1,457	1,449
Connecticut	1,309	1,388	1,393	1,389	1,365
Alabama	1 000	1,192	1,215	1,283	1,301
Maine	1,097	1,112	1.127	1,126	1,146
New York	957	980	998	1,017	1,020
Total, United States	32,149	35,443	35,834	36,617	36,945

[a] From reports of the Bureau of the Census.

cotton, in bales of 478 pounds net, by each of the principal consuming countries is shown in Table V.

or an annual average of 6,800,000 pounds. By 1919, according to estimates based upon the United States census figures, the annual con-

TABLE V—WORLD MILL CONSUMPTION OF RAW COTTON FOR YEARS ENDING JULY 31 [a]

Countries	Bales consumed (thousands) [b] 1913	1919	1920	1921	1922	Per cent of total 1913	1919	1920	1921	1922
United States	5,575	5,831	6,485	4,905	5,904	25.3	34 9	33 6	29 0	29 5
United Kingdom	4,644	2,850	3,870	2,135	2,948	21.0	17 1	20 1	12.6	14 7
European continent	7,514	3,112	3,830	4,600	4,823	34.1	18.6	19 8	27 2	24 1
India	1,843	1,702	1,720	1,925	1,947	8.4	10.2	8.9	11.4	9.7
Japan	1,435	1,956	1,910	1,885	2,275	6.5	11.7	9 9	11.2	11 3
Canada	131	207	230	155	205	.6	1.2	1 2	9	1 0
Other countries	913	1,046	1,255	1,300	1,945	4 1	6.3	6.5	7.7	9.7
Total	22,055	16,704	19,300	16,905	20,047	100.0	100 0	100.0	100 0	100 0

[a] Statistics compiled by United States Bureau of the Census.
[b] Bales of 478 pounds net. Exclusive of linters in figures for United States.

Growth of Mercerization. In 1898, after German and English mercerizers had sought to gain a market in the United States for their yarns and fabrics with the peculiar lustre acquired in the process, the American mercerization industry was founded. It was started in a small way but upon a firm basis and from 1898 to 1904 some 34,000,000 pounds of cotton yarn were estimated to have been mercerized, sumption of mercerized yarns was over 50,000,000 pounds. At the end of 1923 the annual capacity of the largest yarn-mercerizing plant in the United States, working on a single shift basis, was nearly half of the latter amount. In addition, piece mercerizing aggregated hundreds of millions of yards annually and represented as broad a variety of utility as yarn mercerizing.

Wool and Wool Manufacturing. In 1922, Australia led the world as a producer of wool with 618,475,000 pounds, or about 23 per cent of the total, while the United States ranked second with 261,095,000 pounds, or 9.7 per cent of the world supply; and Argentina was third, with 231,483,000 pounds, or 8.6 per cent of the total. After the production and importation of the wool comes the manufacture of the raw material—which includes scouring, carding, spinning, and weaving—into various kinds of cloth, such as worsted goods, woolen goods, carpets and rugs (other than rag), felt goods, and wool-felt hats.

Wool manufacturing according to the census of 1921 ranked second in the value of its product of the five primary textile groups. Raw wool was produced in all of the 48 States, but most of it came from the middle western and far western States. Wool manufacturing, on the other hand, centres in the New England and Middle Atlantic States. Of the 814 establishments reporting for 1921, 198 were located in Pennsylvania, 180 in Massachusetts, 86 in Rhode Island, 57 in Maine, 43 in Connecticut, 39 in New Hampshire, 38 in New York, 28 in New Jersey, 18 in Vermont, and 127 in other States. The numbers of woolen and worsted spindles and looms in the United States are shown in Tables IX and X. The number of persons engaged, wages, value added by manufacture, and total value of product are shown in Table VI.

Knit Goods. This industry in the United States, as will appear from the accompanying tables, from the census of manufactures of 1921, experienced a remarkable growth from 1914 on. It includes the separate industries hosiery, fancy knit goods, underwear, knitted cloth and contract work Cotton hosiery and cotton knit underwear combined represented approximately 52 per cent of the value of the total output ot knit goods in the United States

TABLE VI—WOOLEN AND WORSTED GOODS INDUSTRY IN THE UNITED STATES [a]

Years	Number of establishments [b]	Persons engaged	Salaries and wages	Cost of materials	Value added by manufacture [c]	Value of products
1914	737	164,690	$86,500,000	$246,497,000	$132,987,000	$379,484,000
1919	816	176,392	199 091,000	665,594,000	399,840 000	1,065,434,000
1921	814	171,593	201,243,000	400,046,000	355,538,000	755,584,000

[a] From Bureau of the Census report on the woolen and worsted goods industry 1921
[b] Statistics for establishments with products valued at less than $5000 are not included in the figures for 1921, there were 42 establishments of this class which reported 51 wage earners and products valued at $108,365. For 1914 and 1919, however, data for such establishments are included in the figures, with the exception of the item "Number of establishments"
[c] Value of products less cost of materials.

TABLE VII—PRODUCTION OF PRINCIPAL CLASSES OF WOOLEN AND WORSTED GOODS IN THE UNITED STATES [a]

Classes	1914 Square yards	1919 Square yards	1921 Square yards
Cloths:			
All-wool woolens	90,950,000	139,411,000	132,286,000
All wool worsteds	222,421,000	176,507,000	185,359,000
Wool and cotton mixtures	31,400 000	24,615,000	18,490,000
Cotton warp woolens	53,310,000	39,147,000	44,363,000
Cotton warp worsteds	56,763,000	57,897,000	43 151,000
Blankets [b]	36,565,000	26,779,000	21,491,000

[a] *Manufactures of Woolen and Worsted Goods*, 1921, Bureau of the Census.
[b] Includes all-wool, cotton mixed, cotton-warp, and horse blankets.

TABLE VIII—MANUFACTURES OF WOOL AND WORSTED PRODUCTION AND VALUE, 1921, 1919, 1914

Suitings, Dress Goods, Overcoatings and Cloakings—	Woven Goods: Woolen Goods Square Yards	Woven Goods: Woolen Goods Value	Woven Goods: Worsted Goods Square Yards	Woven Goods: Worsted Goods Value
All-wool—1921	132,286,019	$156,551,258	185,358,745	$279,912,705
1919	139,410,352	243,072,041	176,506,452	313,679,634
1914	90,950,381	55,660,503	222,420,785	141,778,035
Cotton warp—1921	44,363,298	22,664,815	43,151,075	27,780,694
1919	39,146,902	34,735,320	57,896,787	45,342,581
1914	53,509,462	13,598,007	56,763,091	15,563,099
All other woven goods—1921	57,076,484	37,157,356	31,523,934	26,613,853
1919	91,048,688	71,400,115	31,928,391	31,050,104
1914	101,556,656	29,403,793	40,261,784	12,676,043

	Yarns for Sale: Carded Woolen Pounds	Carded Woolen Value	Worsted Pounds	Worsted Value
All-wool—1921	30,734,093	$22,877,337	85,860,513	$126,287,112
1919	28,378,039	32,828,552	74,336,549	185 124,293
1914	26,125,575	8,783,020	86,412,097	69,801,271
Merino—1921	1,578,249	961,809	3,921,451	6,387,595
1919	9,658,894	6,922,886	3,709,056	9,214,421
1914	6,473,849	1,689,530	4,048,514	3,173,034
All other—1921	749,260	501,324	2,772,887	4,064,942
1919	1,086,003	1,100,984	1,132,382	2,343,345
1914	7,378,846	820,535	2,121,180	1,604,825

TABLE IX—WOOLEN AND WORSTED SPINNING SPINDLES IN THE UNITED STATES

Year	Woolen: Number reporting	Woolen: Per cent idle	Worsted: Number reporting	Worsted: Per cent idle
1913	906 000	23	1,592,000	26
1919	2,153,000	19	2,290,000	23
1920	2,250,000	28	2,331,000	22
1921 [a]	2,298,000	59	2,330,000	43
1922 [a]	2,288,000	27	2,436,000	14
1923 [a]	2,294,000	15	2,554,000	10

[a] January only.

TABLE X—WOOLEN AND WORSTED LOOMS IN THE UNITED STATES

Year	Wider than 50-inch reed space		50-inch reed space or less		Carpet and rug	
	Number reporting	Per cent idle	Number reporting	Per cent idle	Number reporting	Per cent idle
1918	89,254	20	11,984	27	2,683	32
1919	60,187	22	18,874	24	7,930	46
1920	61,465	32	18,139	27	8,559	32
1921 [a]	62,687	54	18,147	49	8,574	50
1922 [a]	62,652	34	18,395	27	8,854	22
1923 [a]	63,397	19	17,251	14	9,217	14

[a] January only.

TABLE XI—CARPETS AND RUGS PRODUCTION IN THE UNITED STATES AND VALUE, 1914, 1919, 1921

		Square Yards	Value
Carpets	1921	13,057,385	$20,893,800
Carpets	1919	11,966,209	23,569,093
Carpets	1914	17,311,847	15,186,790
Rugs made of sewed strips	1921	12,070,465	25,951,125
Rugs made of sewed strips	1919	12,472,380	34,588,983
Rugs made of sewed strips	1914	20,854,526	25,945,708
Rugs, woven whole	1921	27,777,813	58,692,611
Rugs, woven whole	1919	27,734 503	51,957,902
Rugs, woven whole	1914	28,174,401	23,550,824
All other products	1921	...	3,842,964
All other products	1919	...	13,137,850
All other products	1914	...	4,444 863

in 1909, but by 1919 this proportion had been reduced to about 41 per cent, due largely to the phenomenal growth of the outerwear industry, which used more wool and silk than cotton. In 1921 New York was the leading State in the industry, producing about 27 per cent of the total value of the output. During that year New York had 710 knit-goods establishments; Pennsylvania, 614; North Carolina, 109; New Jersey, 82; Massachusetts, 81, other States, 482 The number of establishments, employees, value added by manufacture, and total value of product are given in Table XII.

In the 1921 Census there was to be seen a marked increase in quantity and value of fancy knit goods as compared with 1919, and an enormous increase over 1914. The fabric branch of the industry showed a continued growth, with the adoption of these materials for women's wear. While there was a moderate increase in the production of union suits, there was a steady decline in the production of separate shirts and drawers, the output of these garments amounting to a little more than half of the 1919 output. The hosiery production seemed to indicate a stable condition.

Silk Manufactures. Tables XIV, XV, and

TABLE XII—KNIT-GOODS INDUSTRY IN THE UNITED STATES [a]

Years	Number of establishments [b]	Persons engaged	Salaries and wages	Paid for contract work	Cost of materials	Value added by manufacture [c]	Value of products
1914	1,428	159,673	$71,039,000	$3,240,000	$146,687,000	$112,226,000	$258,913 000
1919	1,950	186,673	157,526,000	8,496,000	427,096,000	286,044,000	713,140,000
1921	2,078	175,364	159,929,000	9,075,000	360,458,000	273,616,000	634,074,000

[a] Bureau of the Census report on the knit goods industry, 1921.
[b] Statistics for establishments with products valued at less than $5000 are not included in the figures for 1921; there were 169 establishments of this class which reported 198 wage earners and products valued at $451,000. Data for such establishments for 1914 and 1919 are included in the figures with the exception of the item "Number of establishments."
[c] Value of products less cost of materials.

TABLE XIII—MANUFACTURES OF KNIT GOODS IN THE UNITED STATES—PRODUCTION AND VALUE, 1921, 1919, 1914

Product	1921	1919	1914
Hosiery:			
Dozen pairs	80,240,936	84,645,757	75,164,911
Value	$290,488,560	$308,662,377	$98,098,590
Underwear, value	$134,864,534	$203,530,283	$93,119,085
Shirts and drawers:			
Dozens	11,711,624	17,180,404	21,758,775
Value	$49,875,620	$98,286,403	$57,523,051
Union suits:			
Dozens	9,283,748	9,211,032	6,272,515
Value	$84,988,914	$105,243,880	$35,596,034
Fancy knit-goods, value	$137,005,437	$111,705,313	$46,177,864
Knit cloth, value	$45,299,113	$59,347,745	[a] ...

[a] No comparable data.

TABLE XIV—SILK MANUFACTURES INDUSTRY IN THE UNITED STATES

Bureau of the Census report on silk manufactures, 1921

Years	Number of establishments [a]	Persons engaged	Salaries and wages	Cost of materials	Value added by manufacture [b]	Value of products
1914	856	115,571	$57,615,000	$144,442,000	$109,569,000	$254,011,000
1919	1,317	186,775	134,597,000	388,469,000	300,001,000	688,470,000
1921	1,565	131,697	134,095,000	337,559.000	245,860.000	583,419.000

[a] Statistics for establishments with products valued at less than $5000 are not included in the figures for 1921; there were 109 establishments of this class which reported 225 wage earners and products valued at $365,500 For 1914 and 1919, however, data for such establishments are included in the figures, with the exception of the item "Number of establishments."
[b] Value of products less cost of materials.

TABLE XV—PRODUCTION OF PRINCIPAL CLASSES OF SILK GOODS IN THE UNITED STATES*

Classes		1914	1919	1921
Broad silks	yards..	216,033,696	310,132,060	273,455,388
Velvets	do...	16,318,135	16,150,689	11,477,143
Plushes	do...	9,114,992	5,860,527	5,580,386
Upholstery and tapestries	do...	477,699	516,281	973,749
Silk threads and yarns	pounds.	(b)	11,810,028	14,466,167
Ribbons	value..	$38,201,293	$66,186,609	$53,597,988
Braids and bindings	do...	$3,073,648	$13,218,284	$15,879,046

* Bureau of ensus repot of silk manufactures, 1921.
b No figures available.

TABLE XVI—PRODUCTION OF SILK YARNS, 1921, 1919, 1914

		Pounds
Thrown silk—		
Organzine	1921	7,500,672
Organzine	1919	7,172,742
Organzine	1914	8,581,228
Tram	1921	14,405,165
Tram	1919	11,005,773
Tram	1914	9,358 412
Crepe twist	1921	5,723,386
Crepe twist	1919	5,865,959
Crepe twist	1914	
Spun silk	1921	4,737,137
Spun silk	1919	3,956,637
Spun silk	1914	1,607,416

XVI give comparative statistics of silk manufactures. For statistics of production see SILK.

Other Textile Industries. The other industries, such as cordage and twine, jute and linen goods, while important, do not rank with these already considered and for that reason may be discussed in the present limited space. In 1921, the cordage and twine industry, with 118 establishments, represented an output of $75,356,000. The jute industry, with 24 establishments, represented a production of $17,506,000.

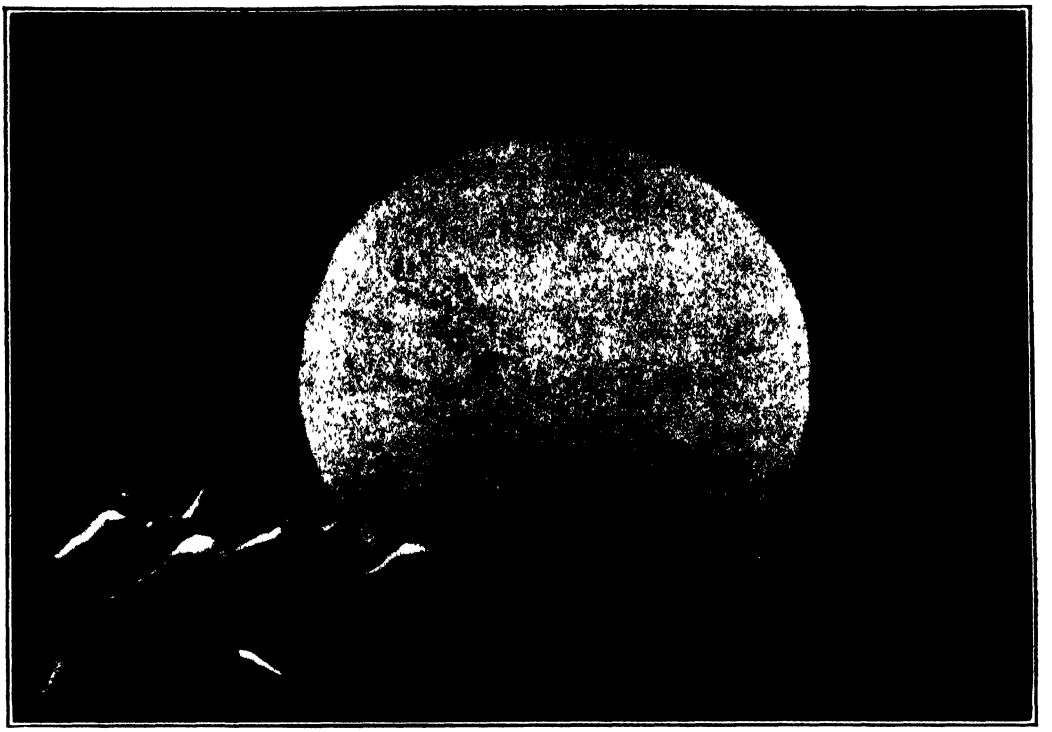
THARAUD, JEAN (1877–) and JEROME (1874–). French novelists (see VOL. XXII). They were awarded the Grand Prix de Littérature of the French Academy in 1920. Their works include: *Dingley, l'Illustre Ecrivain; La Maîtresse Servante; La Fête Arabe; La Tragédie de Ravaillac; La Bataille à Scutari d'Albanie; La Vie et la Mort de Dépoulède; L'Ombre de la Croix; Un Royaume de Dieu; Quand Israel Est Roi; Marocaines; Une Relève; La Randonnée de Sama Diouf; L'An Prochain à Jérusalem.* English translations have been made of *Sama Diouf* and *Un Royaume de Dieu.*

THEATRE, AMERICAN AND ENGLISH An introductory word is perhaps essential to justify the transposition of the supplementary article on DRAMA in THE NEW INTERNATIONAL ENCYCLOPÆDIA to the heading, THEATRE. In brief, this course is a recognition of the fact that the renaissance in dramatic art throughout the world during the last 25 years and in America in particular in the last 10 or 15 years was characterized fundamentally by a realization that the theatre is a distinct and separate art and not a mosaic of several arts, certainly not merely or even primarily a question of drama as literature. Producer and scene designer, actor and musician, came into their own more and more with each passing season as collaborators in this art alongside the playwright. In fact, producer and scenic artist forged beyond the dramatist, challenging him to keep up with the pace they set in order that the art of the theatre might be kept in proper balance.

In this process of becoming independent and not only æsthetically effective but socially significant, the contemporary art of the theatre found in America, and particularly in New York, a haven of refuge, an international clearing-house. Like the Byzantine Greeks at the end of the Middle Ages who fled the dissolution of the Eastern Empire, swarmed into Italy and western Europe and sowed the seeds of the Renaissance, the leading artists of all the continental theatres came to America in an ever-swelling stream because war and the economic and spiritual stagnation of the ensuing peace hampered æsthetic self-expression on their native stages.

During the early years of this influx, accident played the ruling rôle. America was the first open door into which the hounded artist could dodge. Increasingly, the movement assumed definite, conscious and controlled character. Without erecting barriers against any one, America had in later seasons deliberately chosen to invite and welcome those artists who seemed most likely to further by their example and stimulus its own dramatic renaissance. The peak of the movement in this aspect was reached in 1923 when, under the sponsorship of Morris Gest, the Moscow Art Theatre with the entire first line of its world-celebrated acting company arrived in personal charge of its co-founder, Constantin Stanislavsky, to present 13 of its productions for a total of 279 performances in 10 cities and thereby to prove emphatically the worth of thoroughgoing preparation, of the repertory system, of the actor as most indispensable of the theatre's craftsmen and of the coöperative organization of the theatre without a star. Likewise, late in the same year and under the same sponsorship, Max Reinhardt, foremost central European stage director and sharer with Stanislavsky, Gordon Craig and Adolph Appia in the honors of stirring and guiding the contemporary world renaissance of theatrical art, came to New York to exemplify in *The Miracle* his theory of fusing performers and spectators in a vividly emotional experience.

The achievements of the Continental theatres from which the American theatre had thus drawn new life were not for the most part a matter of the last decade It is true, the so-called "expressionist" drama and method of staging plays had developed into a conscious if often still sporadic and ineffectual movement within this period. The revolt against the "realistic" ideology in the theatre followed in the footsteps of similar revolt in the graphic and plastic arts, with diverse attempts to dig beneath and behind the outer aspects of life to the hidden soul within and to "express" or "present" it directly to the human emotions rather than to carry it through the medium of "representing" its superficial aspects. Ernst Toller, author of *Masse Mensch,* Georg Kaiser, author of *From Morn to Midnight,* and Walter Hasenclever, among German playwrights; Nikolai Yevreynov, playwright and producer and proponent of the theory of "monodrama," Vsevolod Meyerhold, producer, and the Kamerny Theatre of Moscow, among Russian dramatic artists; and numerous others of lesser stature



PHOTOGRAPH BY FRANCIS BRUGUIERE

"SALUT AU MONDE"

One of the Festival Productions at the Neighborhood Playhouse; Walt Whitman's Poem, with Music by Charles T. Griffes



PHOTOGRAPH BY FRANCIS BRUGUIERE

A Scene from the Abstract Production of "Macbeth" by Arthur Hopkins from Designs by Robert Edmond Jones

throughout continental Europe, contributed toward this movement.

But, except for the possible influence on the development of the American playwright, Eugene O'Neill, this movement had not found a secure home on the American stage, achieving its bravest defeat with the abstract interpretation of *Macbeth* at the hands of Robert Edmond Jones, designer, and Arthur Hopkins, producer, in the spring of 1921.

The effective impact of foreign stimulus and example on the American theatre was beholden, rather, to personalities and forces whose genesis dated back 20 and 25 years to the Moscow Art Theatre and to Reinhardt, who exerted their influence in person, and to Gordon Craig and Adolph Appia, whose conception of the art of the theatre as a unique and unified art on its own account was exerted from afar or by proxy on American visitors who received the stimulus of their works, their personalities or their ideas abroad and returned to leaven our native stage with them.

In no respect is the contrast between the American theatre and the English more evident than in this mind open to new ideas and in readiness to absorb and often improve on them. From the time the outbreak of the War in 1914 called a halt to the promising repertory theatre movement and to the project for a national theatre as a Shakespeare memorial in London, the English stage was impervious to new impressions from outside and all but barren of native experimental effort. Exceptions to this rule of doldrums were the rebirth, after discouraging struggle, of the Stratford-on-Avon Players, under the sponsorship of Archibald Flower and other Stratford citizens and the guidance of W. Bridges-Adams; the persistent and scarcely appreciated efforts of the Everyman Theatre in Hampstead and of the Old Vic south of the Thames in London; and the continuation of the Birmingham Repertory Theatre, sole survivor of the promising provincial movement that included Manchester, Liverpool and Glasgow before the War. For the most part, however, the chief concern of these theatres was the revival of classic plays.

Among British playwrights, likewise, the 10-year period was discouragingly fruitless. Bernard Shaw alone preserved the reputation of the group, for, without counting short sketches, he added to his canon such major works as *Heartbreak House*, pungent and bitter commentary on the futility of the War; *Back to Methuselah*, mastodonic summary of human civilization in five parts; and *Saint Joan*, ripest flower of his incisive intellect and imagination. John Galsworthy comes second, with *The Skin Game* and *Loyalties* as his most notable contributions to the depiction of contemporary human psychology on the stage. Of the elder figures, Barrie wrought with his old skill in *The Legend of Leonora* and *Dear Brutus* and less successfully in *Mary Rose*, while Pinero's *The Enchanted Cottage* is almost the sole faint reminder of the position he held through the decades that bounded the turn of the century. No playwright of the first order emerged from among the younger generation unless it be Clemence Dane, whose *A Bill of Divorcement* was not matched by her later *Will Shakespeare*. On the Irish side, Lennox Robinson alone fulfilled the promise of his early days when the Abbey Theatre with Synge as its most priceless treasure was holding out hope of a renaissance of English drama. Robinson's output was meagre, but *The Lost Leader* and *The White-Headed Boy* indicated that more would still be heard from him.

The vitality of the American stage presents a strong contrast. Rather, the vitality of the New York stage, for the handicap of prohibitive railroad rates and the competition of the motion picture and other forms of popular amusement during the 10 years all but wiped out the serious theatre outside the metropolis and several of the larger cities Little by little, "the road" was building up its own dramatic structure by the development of Little Theatres, but the process was slow and halting Meanwhile, the audience in the city unfolded, expanded, with an expanding theatre.

Although our playwrights loitered behind our stage designers and our producers, there was more vitality and promise in them than ever before. Eugene O'Neill, still in his early thirties, led with *Beyond the Horizon*, *Diff'rent*, and *Anna Christie* among his major realistic works and *The Emperor Jones* and *The Hairy Ape* as brilliant ventures into expressionism—all written and produced within the last five years of the decade.

But O'Neill was not alone; other noteworthy practitioners of realism were Rachel Crothers; Owen Davis, with *Icebound;* Arthur Richman, with *Ambush;* Gilbert Emery, with *The Hero* and *Tarnish*. Romantic realists included Zoë Akins, reaching her best level in *Déclassée* and *Daddy's Gone a-Hunting;* Edward Sheldon, with the world-popular *Romance;* Percy MacKaye, whose outstanding achievement was his expansive civic masques. Writers of comedy and satire were particularly strong in numbers: George S. Kaufman and Marc Connelly, represented by *Dulcy*, *To the Ladies* and *Beggar on Horseback;* Frank Craven, by *Too Many Cooks* and *The First Year;* George M. Cohan, by *Seven Keys to Baldpate* and *Broadway Jones;* James Forbes, by *The Show Shop* and *The Famous Mrs. Fair;* Jesse Lynch Williams, by *Why Marry?* and *Why Not?;* George Middleton, Guy Bolton, Martin Brown, Don Marquis and many others. Bold experimenters in new forms included Zona Gale, with *Miss Lulu Bett* and *Mr. Pitt;* Elmer Rice, with *On Trial* and *The Adding Machine;* Susan Glaspell, with *Bernice* and *Inheritors*.

Besides these, we have many more who address themselves to an adult intelligence. It is possible to name 30 whose premières could be attended by the reasonably exacting playgoer with at least an even chance of finding something to hold his attention. In sheer numbers, probably no European capital could surpass us. And out of these numbers, by competition, by contagious rivalry and mutual stimulus, something seemed bound to happen.

Our producers, though a nondescript lot, grew more rapidly than the playwrights in their realization of the opportunity offered them. Outgrowing the complacent traditions of the age of the "Elder Showmen," they displayed a willingness to experiment undreamed of a decade earlier. Most heartening was the sound development of groups as producers, such as the Washington Square Players and their inheritors, the Theatre Guild; the Provincetown Players, discoverers of O'Neill; the Neighborhood Playhouse, example of the theatre as both

social and æsthetic experimental force; and the Equity Players, the actors' own theatre. Not the least heartening aspect of the growth of the producer as guiding hand in the unified art of the theatre was the attention devoted to training in play production and play writing in our colleges, especially at the Carnegie Institute of Technology in Pittsburgh and in the "47 Workshop" under Prof. George Pierce Baker at Harvard.

In the vanguard of the awakening American theatre stood the stage designer. Reacting before his fellow craftsmen to the stimulus from abroad, he outdistanced them, only to be wrongfully charged with trying to warp the art of the theatre and draw undeserved attention to himself. Such scenic artists as Robert Edmond Jones, Norman-Bel Geddes, and Lee Simonson, however, had the interest of the entire theatre at heart and generously served the cause of its balanced development rather than their own craft.

Like the playwright, the actor, too, lagged, waiting for more efficient direction and above all, more economic and more human and reasonable theatrical administration to give of his best to an art in which he plays the central rôle.

Nothing can summarize more vividly the range of activity which made up these years from 1914 to 1924 than a list of the outstanding productions made within this period, together with the names of those craftsmen most prominently identified with them. This list is reprinted from the volume, *Our American Theatre*, by Oliver M. Sayler, with the permission of the publisher, Brentano.

Important Productions on the American Stage, 1914-24

Season of 1914-15. *Saint Louis, a Civic Masque*, by Percy Mackaye, produced on Art Hill, Forest Park, St. Louis, Mo., May 28, 1914, by Joseph Lindon Smith and Oliver M. Sayler, with 7500 citizens—preceded by *The Pageant of Saint Louis*, by Thomas Wood Stevens, *On Trial*, by Elmer L. Reizenstein (now Rice), produced at the Candler Theatre (now the Sam H. Harris), New York, Aug. 19, 1914, by Arthur Hopkins and Cohan and Harris, *The Phantom Rival*, by Franz Molnar, produced at the Belasco Theatre, New York, Oct. 6, 1914, by David Belasco, with Leo Ditrichstein; *Pygmalion*, by George Bernard Shaw, produced at the Liberty Theatre, New York, Oct. 12, 1914, by Liebler and Company, with Mrs. Patrick Campbell, *A Pair of Silk Stockings*, by Cyril Harcourt, produced at the Little Theatre, New York, Oct. 20, 1914, by Winthrop Ames; *Chin-Chin*, by Anne Caldwell, R. H. Burnside and Ivan Caryll, produced at the Globe Theatre, New York, Oct. 20, 1914, by Charles B. Dillingham, with Fred Stone and David Montgomery; *Watch Your Step*, by Irving Berlin and Harry B. Smith, produced at the New Amsterdam Theatre, New York Dec. 8, 1914, by Charles B. Dillingham, with Vernon and Irene Castle and Frank Tinney (designers, Robert McQuinn and Helen Dryden), *The Show Shop*, by James Forbes, produced at the Hudson Theatre, New York, Dec. 31, 1914, by Selwyn and Company, with Douglas Fairbanks and George Sidney. *Children of Earth*, by Alice Brown, produced at the Booth Theatre, New York, Jan. 12, 1915, by Winthrop Ames, with Herbert Kelcey and Effie Shannon; *Marie-Odile*, by Edward Knoblauch (now Knoblock), produced at the Belasco Theatre, New York, Jan. 26, 1915, by David Belasco, with Frances Starr; *Androcles and the Lion*, by George Bernard Shaw, produced at Wallack's Theatre, New York, Jan. 27, 1915, by Granville Barker, with O. P. Heggie—preceded by *The Man Who Married a Dumb Wife*, by Anatole France, with scenery by Robert Edmond Jones; *Jephthah's Daughter*, dance drama, music by Lilia Mackay-Cantell, produced at the Neighborhood Playhouse, New York, Feb. 12, 1915, by the Festival Dancers as the first bill of the Playhouse, *A Midsummer Night's Dream*, by William Shakespeare, produced at Wallack's Theatre, New York, Feb. 16, 1915, by Granville Barker; *Interior*, by Maurice Maeterlinck, *Licensed*, by Basil Lawrence (Lawrence Langner), *Eugenically Speaking*, by Edward Goodman, and *Another Interior*, a pantomime arranged by Ralph Roeder—four one-act plays produced at the Bandbox Theatre, New York, Feb. 19, 1915, by the Washington Square Players as their first bill; *The Glittering Gate*, by Lord Dunsany, produced at the Neighborhood Playhouse, New York, Mar. 6, 1915, by the Neighborhood Players, *The Doctor's Dilemma*, by George Bernard Shaw, produced at Wallack's Theatre, New York, Mar. 26, 1915, by Granville Barker, *John Gabriel Borkman*, by Henrik Ibsen, produced at the 48th Street Theatre, New York, Apr. 13, 1915, by Emanuel Reicher, *Nobody Home*, by Guy Bolton and Jerome Kern, produced at the Princess Theatre, New York, Apr. 20, 1915, by F. Ray Comstock and Morris Gest.

Season of 1915-16. The Stratford upon Avon Players, in Shakespearean repertory, with Frank H. Benson and Murray Carrington, appearing in many cities outside New York. *Constancy*, by Neith Boyce, and *Suppressed Desires*, by George Cram Cook and Susan Glaspell, produced at the Wharf Theatre, Provincetown, Mass., in the summer of 1915, by the Provincetown Players as their first bill, *The Boomerang*, by Winchell Smith and Victor Mapes, produced at the Belasco Theatre, New York, Aug. 10, 1915, by David Belasco, with Arthur Byron, Wallace Eddinger and Martha Hedman, *The New York Idea*, by Langdon Mitchell, revived at the Playhouse, New York, Sept. 28, 1915, by William A. Brady, with Grace George, *The Unchastened Woman*, by Louis K. Anspacher, produced at the 39th Street Theatre, New York, Oct. 9, 1915, by Oliver Morosco, with Emily Stevens; *Major Barbara*, by George Bernard Shaw, produced at the Playhouse, New York, Dec. 9, 1915, by William A. Brady, with Grace George, *The Weavers*, by Gerhart Hauptmann, produced at the Garden Theatre, New York, Dec. 14, 1915, by Emanuel Reicher, for the Modern Stage Society, *The Devil's Garden*, by William B. Maxwell and Edith Ellis, produced at the Harris Theatre, New York Dec. 28, 1915, by Arthur Hopkins, Diaghilev's Ballet Russe, presented, with extended repertory, at the Century Theatre, New York, Jan. 16, 1916, by the Metropolitan Opera Company (designers, Leon Bakst, Alexander Benois, Alexander Golovin, etc.), *Erstwhile Susan*, by Helen R. Martin and Marian de Forest produced at the Gaiety Theatre, New York, Jan. 18, 1916, by Corey, Williams and Riter, with Minnie Maddern Fiske, *The Cohan Revue, 1916*, by George M. Cohan, produced at the Astor Theatre, New York, Feb. 9, 1916, by George M. Cohan, *The Magical City*, by Zoe Akins, produced at the Bandbox Theatre, New York, Mar. 20, 1916, by the Washington Square Players, *Justice*, by John Galsworthy, produced at the Candler Theatre (afterward the Sam H. Harris), New York, Apr. 3, 1916, by John D. Williams, with John Barrymore, *A Night at an Inn*, by Lord Dunsany, produced at the Neighborhood Playhouse, New York, Apr. 22, 1916, by the Neighborhood Players; *The Tempest*, by William Shakespeare, produced at the Century Theatre, New York Apr. 24, 1916, by John Corbin and Louis Calvert, for the Drama Society; *Caliban, by the Yellow Sands*, by Percy Mackaye, produced at the Stadium of the College of the City of New York, May 25, 1916, by Oliver M. Sayler, Joseph Urban, Robert Edmond Jones, Richard Ordynski, Garnet Holme, Cecil Sharpe, Hazel Mackaye and Irving Pichel for the New York City Shakespeare Tercentenary Celebration Committee with Isadora Duncan, John Drew, Edith Wynne Matthison, etc., and 2500 citizens (designers, Joseph Urban and Robert Edmond Jones)—reproduced at the Harvard Stadium, Cambridge, Mass., July 2, 1917, by Oliver M. Sayler, Frederick Stanhope, Robert Edmond Jones, Irving Pichel, Samuel A. Eliot, Jr., Virginia Tanner, Percy Burell and Hazel Mackaye, with 5000 citizens.

Season of 1916-17. *Good Gracious, Annabelle*, by Clare Kummer, produced at the Republic Theatre, New York, Oct. 31, 1916, by Arthur Hopkins (designer, Robert Edmond Jones), *Bound East for Cardiff*, by Eugene O'Neill, *The Game*, by Louise Bryant, and *King Arthur's Socks*, by Floyd Dell—three one-act plays produced at the Provincetown Playhouse, New York, in the autumn of 1916, by the Provincetown Players as their first bill in New York City; *Trifles*, by Susan Glaspell, and *Bushido*, from the Japanese of Takeda Izumo, two of a bill of four short plays produced at the Comedy Theatre, New York, Nov. 13, 1916, by the Washington Square Players; *The Inca of Perusalem*, by George Bernard Shaw, *The Queen's Enemies*, by Lord Dunsany, and *Great Catherine*, by George Bernard Shaw—three short plays produced Nov. 14, 1916, at the Neighborhood Playhouse by Gertrude Kingston; *The Gods of the Mountain*, by Lord Dunsany, *Sir Who Pass While the Lentils Boil* and *Nevertheless* by Stuart Walker—three short plays produced in the Portmanteau Theatre at the 39th Street Theatre, New York, Nov. 27, 1916, by Stuart Walker; *A Kiss for Cinderella*, by James M. Barrie, produced at the Empire Theatre, New York, Dec. 25, 1916, by Charles Frohman, Inc., with Maude Adams; *A Successful Calamity*, by Clare Kummer, produced at the



PHOTOGRAPH BY COURTESY OF MORRIS GEST

Worshippers at the altar of the wonder working Madonna in

"THE MIRACLE"

Produced by Morris Gest and staged by Max Reinhardt at the Century Theatre, New York

Booth Theatre, New York, Feb. 5, 1917, by Arthur Hopkins, with William Gillette (designer, Robert Edmond Jones); *The Great Divide*, by William Vaughn Moody, revived at the Lyceum Theatre, New York, Feb. 7, 1917, by Henry Miller, with Henry Miller; *The Kairn of Koridwen*, dance drama, music by Charles T. Griffes, produced at the Neighborhood Playhouse, New York, Feb. 10, 1917, by the Festival Dancers; *Nju*, by Ossip Dymow, produced at the Bandbox Theatre, New York, Mar. 22, 1917, by Joseph Urban and Richard Ordynski (designer, Joseph Urban), *The Rider of Dreams*, *Granny Maumee*, and *Simon the Cyrenian*, three short plays by Ridgely Torrence, produced at the Garden Theatre, New York, Apr. 5 1917, by Emily Hapgood (designer, Robert Edmond Jones).

Season of 1917 18. *The Deluge*, by Henning Berger, produced at the Hudson Theatre, New York, Aug 20, 1917, by Arthur Hopkins, with Pauline Lord —revived at the Plymouth Theatre, New York, Jan 27, 1922, by Mr. Hopkins, *Chu Chin Chow*, by Oscar Asche and Frederick Norton produced at the Manhattan Opera House, New York, Oct. 22, 1917, by F Ray Comstock and Morris Gest, *Madame Sand*, by Philip Moeller, produced at the Criterion Theatre, New York, Nov 19, 1917, by Arthur Hopkins for Klaw and Erlanger, with Minnie Maddern Fiske, Théâtre du Vieux Colombier, of Paris (Jacques Copeau, director), opening a two year engagement at the Garrick Theatre, New York, Dec. 3, 1917, with *Les Fourberies de Scapin*, by Molière, *Why Marry?* by Jesse Lynch Williams, produced at the Astor Theatre, New York, Dec 25, 1917, by Selwyn and Company, with Nat C Goodwin, *Josephine*, by Hermann Bahr, adapted by Frank E Washburn Freund, produced at the Knickerbocker Theatre, New York, Jan. 28, 1918, by the Josephine Company, Inc, with Arnold Daly and Virginia Harned (designer, Rollo Peters); *The Copperhead*, by Augustus Thomas, produced at the Shubert Theatre, New York, Feb 18, 1918, by John D. Williams, with Lionel Barrymore, *The Wild Duck*, by Henrik Ibsen, produced at the Plymouth Theatre, New York, Mar 11, 1918, by Arthur Hopkins, with Alla Nazimova (designer, Robert Edmond Jones).

Season of 1918 19. *A Very Good Young Man*, by Martin Brown, produced at the Plymouth Theatre, New York, Aug. 19 1918, by Arthur Hopkins, with Wallace Eddinger, *Lightnin'*, by Winchell Smith and Frank Bacon, produced at the Gaiety Theatre, New York, Aug 26, 1918, by John Golden, with Frank Bacon; *Redemption*, by Count Liov Tolstoy, produced at the Plymouth Theatre, New York, Oct 3, 1918, by Arthur Hopkins, with John Barrymore (designer, Robert Edmond Jones), *Be Calm, Camilla*, by Clare Kummer, produced at the Booth Theatre New York, Oct. 31, 1918, by Arthur Hopkins (designer, Robert Edmond Jones), *Dear Brutus*, by James M Barrie, produced at the Empire Theatre, New York, Dec 23, 1918, by Charles Frohman, Inc., with William Gillette; *Moliere*, by Philip Moeller, produced at the Liberty Theatre, New York, Mar 17, 1919, by Henry Miller, with Henry Miller, Blanche Bates, Holbrook Blinn and Estelle Winwood; *Bernice*, by Susan Glaspell, produced at the Provincetown Playhouse, New York, Mar. 29, 1919, by the Provincetown Players, *The Jest*, by Sem Benelli, adapted by Edward Sheldon, produced at the Plymouth Theatre, New York, Apr 9, 1919, by Arthur Hopkins, with John and Lionel Barrymore (designer, Robert Edmond Jones); *Papa*, by Zoe Akins, produced at the Little Theatre, New York, Apr. 10, 1919, by F. C Whitney, *The Bonds of Interest*, by Jacinto Benavente, translated by John Garrett Underhill, first production of the Theatre Guild at the Garrick Theatre, New York, Apr 14, 1919; *John Ferguson*, by St. John Ervine, produced at the Garrick Theatre, New York, May 12, 1919, by the Theatre Guild, with Augustin Duncan, Dudley Digges and Rollo Peters.

Season of 1919-20. *Clarence*, by Booth Tarkington, produced at the Hudson Theatre, New York, Sept. 20, 1919, by George C. Tyler; *Déclassée*, by Zoë Akins, produced at the Empire Theatre, New York, Oct. 6, 1919, by Charles Frohman, Inc, with Ethel Barrymore; *The Lost Leader*, by Lennox Robinson, produced at the Greenwich Village Theatre, New York, Nov. 12, 1919, by William Harris, Jr, with Frank Conroy; *Abraham Lincoln*, by John Drinkwater, produced at the Cort Theatre, New York, Dec. 15, 1919, by Lester Lonergan for William Harris, Jr; *The Famous Mrs. Fair*, by James Forbes, produced at Henry Miller's Theatre, New York, Dec. 22, 1919, by Henry Miller, with Henry Miller and Blanche Bates; *Night Lodging*, by Maxim Gorki, produced at the Plymouth Theatre, New York, Dec. 22, 1919, by Arthur Hopkins; *Mama's Affair*, by Rachel Barton Butler, produced at the Little Theatre, New York, Jan. 19, 1920, by Oliver Morosco, with Effie Shannon; *The Beautiful Sabine Women*, by Leonid Andréev, produced at the Neighborhood Playhouse, New York, Feb. 2, 1920, by the Neighborhood Players; *Beyond the Horizon*, by Eugene O'Neill, produced at the Morosco Theatre, New York, Feb. 3, matinee, 1920, by John D. Williams, with Richard Bennett (designer, Homer Saint-Gaudens); *The Letter of the Law*, by Eugène Brieux, produced at the Criterion Theatre, New York, Feb. 23, 1920, by John D. Williams, with Lionel Barrymore, *Jane Clegg*, by St. John Ervine, produced at the Garrick Theatre, New York, Feb. 23, 1920, by Emanuel Reicher for the Theatre Guild, with Margaret Wycherly (designer, Lee Simonson), *Richard III*, by William Shakespeare, produced at the Plymouth Theatre, New York, Mar. 6, 1920, by Arthur Hopkins, with John Barrymore (designer, Robert Edmond Jones), *What's in a Name?* by John Murray Anderson and Milton Ager, produced at the Maxine Elliott Theatre, New York, Mar 19, 1920, by John Murray Anderson (designers, Robert Locker and James Reynolds), *La Boutique Fantasque*, music by Rossini, produced at the Neighborhood Playhouse, New York, May 8, 1920, by the Festival Dancers.

Season of 1920-21. *Enter Madame*, by Gilda Varesi and Dolly Byrne, produced at the Garrick Theatre New York, Aug. 16, 1920, by Brock Pemberton, with Gilda Varesi; *The Bad Man*, by Porter Emerson Browne, produced at the Comedy Theatre, New York, Aug 30, 1920, by Lester Lonergan for William Harris, Jr, with Holbrook Blinn (designer, Livingston Platt); *Greenwich Village Follies of 1920*, by John Murray Anderson and A. Baldwin Sloane, produced at the Greenwich Village Theatre, New York, Aug 30, 1920, by John Murray Anderson for the Bohemians, Inc, with Margaret Severn (designers Robert Locker and James Reynolds); *The Mob*, by John Galsworthy produced at the Neighborhood Playhouse, New York, Oct. 9, 1920, by the Neighborhood Players, *The First Year*, by Frank Craven, produced at the Little Theatre New York, Oct. 20, 1920, by Winchell Smith for John Golden, with Frank Craven; *The Skin Game*, by John Galsworthy, produced at the Bijou Theatre New York, Oct 20 1920, by Basil Dean, for William A. Brady; *The Emperor Jones*, by Eugene O'Neill produced at the Provincetown Theatre, New York Nov. 1, 1920, by the Provincetown Players, with Charles S. Gilpin (designer, Cleon Throckmorton); *Heartbreak House*, by George Bernard Shaw, produced at the Garrick Theatre, New York, Nov 10, 1920, by Dudley Digges, for the Theatre Guild (designer, Lee Simonson); *Samson and Delilah*, by Sven Lange, produced at the Greenwich Village Theatre, New York, Nov. 17, 1920, by Arthur Hopkins, with Jacob Ben-Ami and Pauline Lord (designer, Robert Edmond Jones), *Mixed Marriage*, by St John Ervine, produced at the Bramhall Playhouse, New York, Dec 14, 1920, by Augustin Duncan (designer, Rollo Peters), *Sally*, by Guy Bolton and Jerome Kern, produced at the New Amsterdam Theatre, New York Dec 21, 1920, by F. Ziegfeld, Jr, with Marilyn Miller and Leon Erroll (designer, Joseph Urban); *Deburau*, by Sacha Guitry, adapted by Granville Barker, produced at the Belasco Theatre, Dec 23, 1920, by David Belasco (designer, Ernest Gros); *Diff'rent*, by Eugene O'Neill, produced at the Provincetown Playhouse, New York, Dec 27, 1920, by the Provincetown Players (designer, Cleon Throckmorton); *Miss Lulu Bett*, by Zona Gale, produced at the Belmont Theatre, New York, Dec. 27, 1920, by Brock Pemberton, with Carroll McComas; *The Beggar's Opera*, by John Gay, Nigel Playfair's London production presented at the Greenwich Village Theatre, New York, Dec. 29, 1920, by Arthur Hopkins (designer, C. Lovat Fraser); *Erminie*, by Harry Paulton and E Jacobowski, revisions by Marc Connelly, revived at the Park Theatre New York, Jan 3, 1921, by George C. Tyler, with Francis Wilson and De Wolf Hopper (designer, Norman-Bel Geddes); *Macbeth*, by William Shakespeare, produced at the Apollo Theatre, New York, Feb 17, 1921 by Arthur Hopkins, with Lionel Barrymore and Julia Arthur (designer, Robert Edmond Jones); *Mr. Pim Passes By*, by A A Milne, produced at the Garrick Theatre, New York, Feb. 28, 1921, by Philip Moeller, for the Theatre Guild (designer, Lee Simsonson), *The Hero*, by Gilbert Emery, produced at the Longacre Theatre, New York matinee, Mar 14, 1921, by Sam Forrest for Sam H Harris, with Robert Ames—revived at the Belmont Theatre, New York, Sept. 5, 1921; *Inheritors*, by Susan Glaspell, produced at the Provincetown Theatre, New York, Mar 21 1921, by the Provincetown Players (designer, Cleon Throckmorton); *The Trial of Joan of Arc*, by Emile Moreau, produced at the Century Theatre, New York, Apr 3, 1921, by Margaret Anglin and Maurice Browne, with Miss Anglin (designer, Ernest de Weerth); *Liliom*, by Franz Molnar, produced at the Garrick Theatre, New York, Apr. 20, 1921, by Frank Reicher for the Theatre Guild, with Joseph Schildkraut (designer, Lee Simonson); *Shuffle Along*, by Miller and Lyles, produced at the 63rd Street Theatre, New York, May 23, 1921, by Walter Brooks, for the Nikko Company, Inc.

Season of 1921-22. *The Pilgrim Spirit*, by Prof. George Pierce Baker, produced at Plymouth, Mass., July 20, 1921, by Professor Baker (designer, Rollo Peters); *The Detour*, by Owen Davis, produced at the Astor Theatre, New York, Aug. 23, 1921, by Augustin

Duncan for Lee and J J. Shubert, with Augustin Duncan and Effie Shannon; *Daddy's Gone a-Hunting*, by Zoe Akins, produced at the Plymouth Theatre, New York, Aug 31, 1921, by Arthur Hopkins, with Marjorie Rambeau (designer, Robert Edmond Jones); *Swords*, by Sidney Howard, produced at the National Theatre, New York, Sept 1, 1921, by Brock Pemberton, with Clare Eames (designer, Robert Edmond Jones), *The Circle*, by W Somerset Maugham, produced at the Selwyn Theatre, New York, Sept. 12, 1921, by Clifford Brooke for the Selwyns, with Mrs. Leslie Carter and John Drew; *The White-Headed Boy*, by Lennox Robinson, produced at Henry Miller's Theatre, New York, Sept 15, 1921, by J B. Fagan for Charles Dillingham, with Arthur Sinclair and Maire O'Neill, *The Music Box Revue, 1921*, by Irving Berlin, produced at the Music Box, New York, Sept 22, 1921, by Hassard Short for Sam H Harris and Irving Berlin, *Blossom Time*, by A M Willner, H. Reichert and Dorothy Donnelly, music arranged from Franz Schubert, produced at the Ambassador Theatre, New York, Sept 29, 1921, by Lee and J. J. Shubert; *Bombo*, by Harold Atteridge and Sigmund Romberg, produced at Jolson's 59th Street Theatre, New York, Oct 6, 1921, by J C. Huffman for Lee and J J. Shubert, with Al Jolson, *Ambush* by Arthur Richman, produced at the Garrick Theatre, New York, Oct. 10, 1921, by Robert Milton for the Theatre Guild; *A Bill of Divorcement*, by Clemence Dane, produced at the George M. Cohan Theatre, New York, Oct 10, 1921, by Basil Dean for Charles B Dillingham, with Allan Pollock and Katherine Cornell; *The Claw*, by Henri Bernstein, produced at the Broadhurst Theatre, New York, Oct. 17, 1921, by Arthur Hopkins, with Lionel Barrymore (designer, Robert Edmond Jones); *Anna Christie*, by Eugene O'Neill, produced at the Vanderbilt Theatre, New York, Nov 2, 1921, by Arthur Hopkins, with Pauline Lord and George Marion (designer, Robert Edmond Jones); *The Straw*, by Eugene O'Neill, produced at the Greenwich Village Theatre, New York, Nov. 10, 1921, by George C. Tyler, with Margalo Gilmore and Otto Kruger, *Kiki*, by André Picard and David Belasco, produced at the Belasco Theatre, New York, Nov. 29, 1921, by David Belasco, with Lenore Ulric; *The Dover Road*, by A. A. Milne, produced at the Bijou Theatre, New York, Dec. 23, 1921, by Guthrie McClintic; *Captain Applejack*, by Walter Hackett, produced at the Cort Theatre, New York Dec. 30, 1921, by Oliver M. Sayler for Sam H. Harris, with Wallace Eddinger; *S.S "Tenacity,"* by Charles Vildrac, translated by Sidney Howard, produced at the Belmont Theatre, New York, Jan. 2, 1922, by Augustin Duncan (designer, Robert Edmond Jones); Baliev's Chauve-Souris (Letutchaya Muish or the Bat Theatre of Moscow), presented at the 49th Street Theatre, New York, Feb 3, 1922, and moved to the Century Roof Theatre, June 5 1922, by F. Ray Comstock and Morris Gest, with Nikita Baliev (designers, Sergei Sudeykin and Nikolai Remisov); *Back to Methuselah*, by George Bernard Shaw, five parts produced in three evenings at the Garrick Theatre, New York, Feb 26, Mar 5 and Mar 12, 1922, by Alice Lewisohn, Agnes Morgan and Frank Reicher for the Theatre Guild (designer, Lee Simonson); *The Hairy Ape*, by Eugene O'Neill, produced at the Provincetown Playhouse, New York, Mar 9, 1922, by the Provincetown Players, assisted by Arthur Hopkins, with Louis Wolheim (designers, Robert Edmond Jones and Cleon Throckmorton); *The Truth About Blayds*, by A. A. Milne, produced at the Booth Theatre, New York, Mar. 14, 1922, by Winthrop Ames, with O. P. Heggie (designer, Norman-Bel Geddes); *Salut au Monde*, by Walt Whitman, set to music by Charles T Griffes, produced at the Neighborhood Playhouse, New York, Apr. 22, 1922, by the Neighborhood Players (designer, Esther Peck); *From Morn to Midnight*, by Georg Kaiser, translated by Ashley Dukes, produced at the Garrick Theatre, New York, May 21, 1922, by Frank Reicher for the Theatre Guild (designer, Lee Simonson)

Season of 1922-23. *Loyalties*, by John Galsworthy, produced at the Gaiety Theatre, New York, Sept 27, 1922, by Basil Dean for Charles B Dillingham; *R. U. R.*, by Karel Capek, translated by Paul Selver and Nigel Playfair, produced at the Garrick Theatre, New York, Oct. 9, 1922, by Philip Moeller for the Theatre Guild (designer, Lee Simonson), *To Love*, by Paul Géraldy, translated by Grace George, produced at the Bijou Theatre, New York, Oct. 17, 1922, by Grace George, with Grace George, Norman Trevor and Robert Warwick; *Six Characters in Search of an Author*, by Luigi Pirandello, translated by Edward Storer, produced at the Princess Theatre, New York, Oct. 30, 1922, by Brock Pemberton; *The World We Live In (The Insect Comedy)*, by Josef and Karel Capek, adapted by Owen Davis, produced at Jolson's 59th Street Theatre, New York, Oct. 31, 1922, by John Cromwell for William A. Brady (designer, Lee Simonson); *Rain*, by John Colton and Clemence Randolph, founded on a story by W. Somerset Maugham, produced at the Maxine Elliott Theatre, New York, Nov. 7, 1922, by John D. Williams for Sam H. Harris, with Jeanne Eagels; *Hamlet*, by William Shakespeare, produced at the Sam H. Harris Theatre, New York, Nov 16, 1922, by Arthur Hopkins, with John Barrymore and Rosalind Fuller (designer, Robert Edmond Jones), *The Merchant of Venice*, by William Shakespeare, produced at the Belasco Theatre, New York, Dec. 21, 1922, by David Belasco, with David Warfield; *Why Not?* by Jesse Lynch Williams, produced at the 48th Street Theatre, New York, Dec 25, 1922, by the Equity Players, Inc , *Will Shakespeare*, by Clemence Dane, produced at the National Theatre, New York, Jan 1, 1923, by Winthrop Ames (designer, Norman Bel Geddes); The Moscow Art Theatre, Constantin Stanislavsky and Vladimir Nemirovitch-Dantchenko, Directors, presented at Jolson's 59th Street Theatre, New York, by F. Ray Comstock and Morris Gest in the following repertory, with dates of premières *Tsar Fyodor Ivanovitch*, by Count Alexei Tolstoy, Jan. 8, 1923—*The Lower Depths*, by Maxim Gorky, Jan. 15, 1923—*The Cherry Orchard*, by Anton Tchekoff Jan. 22, 1923—*The Three Sisters*, by Anton Tchekoff, Jan. 29, 1923—*The Brothers Karamazoff* (three scenes), by Fyodor Dostoyevsky, and *The Lady from the Provinces*, by Ivan Turgenieff, Feb 26, 1923, second American season of the Moscow Art Theatre at Jolson's 59th Street Theatre, New York, in the following repertory *The Brothers Karamazoff* (six scenes), by Dostoyevsky, Nov. 19, 1923—*The Mistress of the Inn*, by Carlo Goldoni, Nov 21, 1923—*Ivanoff*, by Anton Tchekoff, Nov. 26, 1923—*In the Claws of Life*, by Knut Hamsun, Nov. 29, 1923—*An Enemy of the People*, by Henrik Ibsen, Dec 3, 1923—*Enough Stupidity in Every Wise Man*, by Alexander Ostrovsky, Dec. 5, 1923—*Uncle Vanya*, by Anton Tchekoff, Jan 28, 1924—*The Death of Pazukin*, by Mihail Saltuikoff-Shchedrin, Feb 11, 1924, *Romeo and Juliet*, by William Shakespeare, produced at Henry Miller's Theatre, New York, Jan. 24, 1923, by Frank Reicher for the Selwyns, with Jane Cowl (designer, Rollo Peters); *Icebound*, by Owen Davis, produced at the Sam H. Harris Theatre, New York, Feb 10, 1923, by Sam Forrest for Sam H. Harris; *You and I*, by Philip Barry, produced at the Belmont Theatre, New York, Feb. 19, 1923, by Robert Milton for Richard G Herndon, with Lucile Watson and H B Warner, *The Devil's Disciple*, by George Bernard Shaw, produced at the Garrick Theatre, New York, Apr 23, 1923, by Philip Moeller for the Theatre Guild (designer, Lee Simonson).

Season of 1923-24. *Sunup*, by Lula Vollmer, produced at the Provincetown Playhouse, New York, May 24, 1923, by the Players Company, Incorporated, *Tarnish*, by Gilbert Emery, produced at the Belmont Theatre, New York, Oct 1, 1923, by John Cromwell, Incorporated; *The Shame Woman*, by Lula Vollmer, produced at the Greenwich Village Theatre, New York Oct 16, 1923, by the Independent Theatre, Incorporated; Eleonora Duse, presented by F. Ray Comstock and Morris Gest at the Metropolitan Opera House, New York, Oct 29, 1923, in *The Lady from the Sea*, by Henrik Ibsen, and thereafter at the Century Theatre, New York, Nov. 6, 13, 20, and 27 in *Ghosts*, by Ibsen, *Cosi Sia* ('Thy Will Be Done'), by Gallarati-Scotti, *La Porta Chiusa* ('The Closed Door'), by Marco Praga, and *La Citta Morta* ('The Dead City'), by Gabriele d'Annunzio; *Cyrano de Bergerac*, by Edmond Rostand, produced at the National Theatre, New York, Nov. 1, 1923, by Walter Hampden, with Walter Hampden, *Saint Joan*, by George Bernard Shaw, produced at the Garrick Theatre, New York, Dec 28, 1923, by Philip Moeller for the Theatre Guild (designer, Raymond Sovey); *Hell-Bent fer Heaven*, by Hatcher Hughes, produced at the Klaw Theatre, New York, Dec. 30, 1923, by Augustin Duncan for Marc Klaw, Inc.; *Kid Boots*, by William Anthony McGuire, Otto Harbach and Harry Tierney, produced at the Earl Carroll Theatre, New York, Dec. 31, by F. Ziegfeld, Jr., with Eddie Cantor and Mary Eaton; *Outward Bound*, by Sutton Vane, produced at the Ritz Theatre, New York, Jan 7, 1924, by William Harris, Jr; André Charlot's Revue of 1924, presented at the Times Square Theatre, New York, Jan 9, 1924, by Selwyn and Company; *The Miracle*, by Karl Vollmoeller, Engelbert Humperdinck, and Friedrich Schirmer, produced at the Century Theatre, New York, Jan 15, 1924, by Max Reinhardt for F. Ray Comstock and Morris Gest (designer, Norman Bel Geddes), *Fashion*, by Anna Cora Mowatt, produced at the Provincetown Playhouse, New York, Feb. 3, 1924, by Robert Edmond Jones and James Light for the Provincetown Players (designers, Reginald Marsh, Cleon Throckmorton and Robert Edmond Jones); *The Show-Off*, by George Kelly, produced at the Playhouse, New York, Feb. 5, 1924, by Stewart and French; *Beggar on Horseback*, by George S Kaufman and Marc Connelly, after a play by Paul Apel, produced at the Broadhurst Theatre, New York, Feb. 12, 1924, by Winthrop Ames (designer, Woodman Thompson); *Fata Mor-*

gana, by Ernst Vajda, produced at the Garrick Theatre, New York, Mar. 3, 1924, by Philip Moeller for the Theatre Guild (designer, Lee Simonson); *Man and the Masses*, by Ernst Toller, produced at the Garrick Theatre, New York, Apr. 14, 1924, by Lee Simonson for the Theatre Guild (designer, Lee Simonson); *Expressing Willie*, by Rachel Crothers, produced at the 48th Street Theatre, New York, Apr. 10, 1924, by the Equity Players, Inc.; *Hedda Gabler*, by Henrik Ibsen, produced at the 48th Street Theatre, New York, May 16, 1924, by Robert Edmond Jones for the Equity Players, Inc.

THELEN, MAX (1880–). An American lawyer, born at Rising City, Neb., and educated in law at the University of California. In 1904 he began the practice of law in San Francisco. He was for many years counsel for several railroads and for the California State Railroad Commission, of which he was a member from 1912 to 1918. He lectured on international law at the University of California from 1907 to 1913. During the War he was chairman of the special war commission and was also chairman of the petroleum commission of the California State Council of Defense. During the period of the War and after, he filled many important positions on advisory boards, on matters relating to railroads, and was Director of Public Service for the United States Railroad Administration in 1919–20. For his services he was awarded the Distinguished Service Medal. He was a member of legal and other societies and was the author of *Leading Railroad and Public Service Commissions* (1912).

THEOSOPHICAL SOCIETY. A society founded in New York City, in 1875, by Mme. H. P. Blavatsky, assisted by Henry S. Olcott, William Q. Judge, and others. The international headquarters were removed in 1879 to Adyar in India, the residence of Dr. Annie Besant, president of the society. Its objects, in general, are to study all matters relating to theosophy and to furnish information in regard to it. The headquarters of the American section are at Chicago, and branches are maintained in all parts of the world. The society continued its activities in the decade 1914–24. Many new lodges were organized. The membership increased from 4714 in 1916 to 7048 in 1918, and to some 8000 in 1923. L. W. Rogers, elected in 1920, was president of the American section.

THEUNIS, GEORGES (?–). A Belgian statesman. He began his career in the army, but soon tired of garrison duty and left it for a position on the stock exchange of Brussels. He reëntered the army in 1914 with the rank of colonel and was at once appointed by the government to buy war supplies in England. His success in this work led to his appointment as Belgian High Commissioner at London and later as Belgian delegate in the settlement of the financial and economic questions arising out of the indemnity conferences. In 1910 he was made finance minister, and at the end of 1921 he became premier. Here many difficulties confronted him, among them the problem of Flemish disaffection and the occupation of the Ruhr. In 1924 he attended the Reparations Commission's conference in London and took part in the deliberations in regard to the Dawes Report which was finally adopted in August, 1924.

THIBAUD, JACQUES (1880–). A French violinist, born at Bordeaux. He received his first instruction from his father and then entered the Paris Conservatoire, where he studied under Marsick and won the first prize in 1896. After his début at Paris in 1898, he made several very successful tours of Europe and visited the United States for the first time in 1903. In December, 1914, an American tour was suddenly interrupted by the death of his father, and after that he served a year in the French army. The experiences through which he passed must have made an indelible impression on his mind and affected his whole conception of art. On his reappearance in 1916, he revealed a breadth of conception and an emotional intensity of which his previous performances had given no intimation. From a player of charming elegance and refinement he had, in an incredibly short time, grown into one of colossal power.

THIBAUDET, ALBERT (1874–). A French literary critic, born at Tournus, Saône-et-Loire, and educated at the Sorbonne, where he became a professor. His studies on Barrès, Bergson, and the intellectual currents of the last generation in French letters, are genuine and disciplined analyses of modern life. His works include: *La Poésie de Stéphane Mallarmé; Les Heures de l'Acropole; Trente Ans de Vie Française; Gustave Flaubert; La Vie de M. Maurice Barrès; Le Bergsonisme.*

THOMAS, JAMES HENRY (1878–). An English Labor politician, born at Newport. He started to work when but nine years of age as errand boy and later was engine cleaner, fireman, and engine driver for the Great Western Railway Company. He soon became prominent in the labor unions and in 1910 was elected president of the Amalgamated Society of Railway Servants, since merged in the National Union of Railway Servants, of which he was secretary for many years. He was elected to Parliament in 1910. During the War he used his great influence with the railway men in composing labor disputes and obtained large increases in wages for them. In March, 1919, he visited Lloyd George in Paris by airplane to consult him in regard to a railway strike crisis. He was made Privy Councilor in 1917 and Colonial Secretary in the Labor cabinet in 1924.

THOMPSON, WILLIAM BOYCE (1869–). An American banker, born at Virginia City, Mont., and educated at the Columbia University School of Mines. Engaging in business in New York City, he became director and officer in many important financial institutions. From its organization until 1919 he was a director of the Federal Reserve Bank in New York and in 1919 became president of the Roosevelt Memorial Association. He headed the American Red Cross Commission to Russia in 1917 and was envoy extraordinary from the United States to the first centennial of the Proclamation of Independence of the Republic of Peru. In 1921–22 he was a member of the advisory committee of the American delegation at the Disarmament Conference.

THOREK, MAX (1880–). An American surgeon who, having received his degree from Rush Medical College in 1904, settled in Chicago and for a time was connected with the medical department of Loyola University as professor of clinical surgery. He was later chosen president and surgical chief of the new American Hospital and is also one of the consulting surgeons of Cook County Hospital. He has done considerable work in experimental surgery, has written numerous surgical papers, and in 1909 translated into English Krause's *Surgery of the Brain and Spinal Cord.* In

1924 appeared his large monograph *The Human Testis*, in which are summed up all the developments in the grafting of the male gonad.

THORNDIKE, EDWARD LEE (1874–). An American educational psychologist (see VOL. XXII). He became in 1921 professor and director of psychology of the Institute of Educational Research. He published after 1914 numerous important monographs and papers on the application of mathematics to educational measurement, and also new editions of his standard two-volume work on *Educational Psychology*

THRACE. Largely a transition land between the Turkish and Balkan peoples, without natural boundaries, and with mixed racial groups. Thrace, like Macedonia to the south, has been one of the storm-centres of the Balkans. The Treaty of Bucharest (1913) placed Greece, on the east, at the Mesta River. Between the Mesta and the Maritza, by the same treaty, Bulgaria acquired the region known as Western Thrace. East of the Maritza, including Adrianople and Kirk Kilissa, and stretching to the Straits, extended the region known as Eastern Thrace, which continued to remain in Turkish hands. Western Thrace, with a total population of 200,500, comprised 44,000 Greeks, 124,000 Turks, 29,500 Bulgars, 3000 others; Eastern Thrace, with a population of 805,369, was made up of 395,515 Greeks, 344,011 Turks, 67,843 Bulgars. For the realization of the Greater Greece, therefore, it was necessary to expand to the south and east to absorb these Greek populations and at the same time complete the encirclement of Constantinople, the barring of Bulgaria from the Ægean, and the shutting off of Turkey from its contacts with Europe. Thus, in the way of Greece stood Bulgaria and Turkey, and largely because these were allied with the Central Powers, was Venizelos convinced that Greece's lot had to be thrown in with the Entente. Bulgaria, of course, was not unaware of where her own interests lay. In 1915, as the price of her entry into the War, she exacted from Turkey two important strips of territory, one being the Adrianople enclave, particularly Karagach, and the second the left bank of the Maritza. But with the Entente triumphant the realization of Greek nationalistic hopes seemed assured. By the Treaty of Neuilly (Nov. 27, 1919) Bulgaria was compelled to cede Western Thrace to the Allies for Greece, and Greek sovereignty was circumscribed only in these three respects: (1) Bulgarian freedom of transit of the Ægean was guaranteed; (2) the Maritza might be constituted an international river if Greece and Bulgaria requested it; (3) racial minorities, particularly at Adrianople, were to be protected. While the cession, territorially, was of no great importance—the region has only a length of 80 miles and an average depth of 30—and really left Bulgaria with a strategic boundary line, economically it meant Bulgarian disaster. Bulgaria was deprived of her front on the Ægean, of contact with the ports of Kavalla, Porto Lagos, Dedeagach—in short of the fruits of the First Balkan War—and compelled to be once again a Black Sea country. Bulgarians, in 1919, felt that they were then where they had been in 1911.

Here was the realization of one part of the Greek programme. But it was only a minor part, for Eastern Thrace was the section Venizelos, above all things, desired. Lloyd George had shown himself consistently friendly to the Greek aspirations. By gaining over the powerful British support, Venizelos saw his hopes crowned with success when in 1920 Greek troops received permission to occupy Eastern Thrace. By the Treaty of Sèvres (Aug. 10, 1920), the stamp of permanency seemed to be put on the proceedings, for Turkey was compelled to grant to Greece all of Eastern Thrace to the Chatalja lines (i.e. the western boundaries of the Zone of the Straits). Greece now not only had a firm foothold on the whole Ægean, possessed Adrianople and Kirk Kilissa, but also had an outlet on the Black Sea. But Venizelos fell in November, 1920, and with his passing the star of Greece entered into its decline. The fortunes of Greece in the years 1921 and 1922 are reviewed elsewhere in this work (see GREECE, TURKEY, SMYRNA). The destiny of Eastern Thrace depended upon the success or failure of the Greek arms, and with the Turkish nationalist victory, Greeks were compelled to see their representatives renounce Eastern Thrace and Adrianople to the "Grand National Assembly of Turkey," by the Mudania Agreement of Oct. 11, 1922. Turks immediately occupied the area up to the right bank of the Maritza. By the Treaty of Lausanne (July 24, 1923) Greece was completely humiliated. Not only was she compelled to part with Smyrna (q.v.) and the Dodecanese (q.v.), but the whole of Eastern Thrace was taken from her to be turned back to Turkey. Greece's frontier stopped at the Maritza, with the exception of the Karagach district opposite Adrianople; Turkish sovereignty was once more proclaimed over Adrianople and Kirk Kilissa. For the prevention of boundary disorders, the Treaty of Lausanne, in an annexe, provided for the demilitarization of a special area stretching from the Ægean between Makri and Imbrije Burnu to the Black Sea between Anberler and Serkes Burnu, and including the Greek, Bulgarian, and Turkish boundaries in Eastern Thrace

THROOP POLYTECHNIC INSTITUTE. See CALIFORNIA INSTITUTE OF TECHNOLOGY

THURINGIA. A Free State of Germany formed, on Dec. 24, 1919, by the union of the following states: Saxe-Weimar, Saxe-Meiningen, Saxe-Altenburg, Schwarzburg-Rudolstadt, Schwarzburg-Sonderhausen, Saxe-Gotha (Coburg had merged with Bavaria), Reuss (formed on Apr. 4, 1919, of the two republics of Reuss) Total area, 4546 square miles; population in 1919, 1,512,806. Principal towns with their 1919 population: Weimar, the capital, 41,403; Gera, 74,993; Gotha, 48,543; Jena, 53,906 The German Reich, on Apr 30, 1920, recognized the union as being consonant with the provisions of Article 18 of the new German constitution of 1919. Elections to the first diet of Thuringia were held in June, 1920, and this body, on Mar. 11, 1921, adopted the constitution which a Volksrat or People's Council, made up of representatives of the old legislatures had drawn up Like the other states of the Reich, Thuringia has a single-chamber diet elected by proportional representation. The executive power is vested in a ministry elected by the diet and made up (1921) of five ministers with portfolio and three councilors of state (without portfolio). There is no president Legislative power is in part delegated and in part directly

applied, for the electorate may exercise the initiative and referendum. See GERMANY.

THURSTON, ERNEST TEMPLE (1879–). An English novelist, born at Halesworth. At the age of 16 he published two volumes of verse, and his first novel appeared two years later. His writings include: *The Apple of Eden* (1905); *Traffic* (1906); *The Evolution of Katherine* (1907); *The Realist* (1907), *Sally Bishop* (1908); *The City of Beautiful Nonsense* (1909); *The Greatest Wish in the World* (1910); *The Garden of Resurrection* (1911); *The Antagonists* (1912); *Richard Furlong* (1913); *The Passionate Crime* (1915); *The Five-Barred Gate* (1916); *Enchantment* (1917); *The World of Wonderful Reality* (1920); *The Green Bough* (1921); *The Eye of the Wift* (1922). His plays include: *The Greatest Wish* (1912); *Driven* (1914); *The Cost* (1914); *The Wandering Jew* (1920).

TIBET. A Chinese outer territory, with an area of 463,200 square miles, and a population estimated at from 2,000,000 to 6,000,000. Lhasa, the capital, had from 15,000 to 20,000 inhabitants in 1923. Agriculture was carried on, but only to a slight extent because of the difficult topography. Pastoral pursuits were more common. Communications, by means of caravan, were maintained with China and India, an active barter in tea, silks, cotton goods, carpets, leathers, dried fruits and household utensils for the native wool, fox skins, musk, salt, and borax, being prosecuted. In 1921–22, a typical post-war year, exports into India, mainly raw wool, totaled £231,100; imports from India, £551,300, mainly cotton goods. The British penetration, actuated by a desire to establish economic relations between India and Tibet and to reach southern China, continued during the period 1914–24. The political situation remained anomalous. The Chinese government's refusal to accept the terms of the Simla agreement of 1914 which provided for an autonomous Outer Tibet and an Inner Tibet ruled from Peking, and the continued demands of Tibetans for independence, brought about a state of suspicion and hostility which broke out into open war in 1917. Tibetans marched on Chamdo, claimed for both Outer and Inner Tibet, and took it in 1918. An armistice followed, and in the next year the Chinese displayed their desire for peace by proposing a renewal of treaty discussions But the Chinese government showed its weakness by its inability to put down native uprisings in the Inner Tibet, while Great Britain's interest in safeguarding the Indian frontier complicated matters. By 1924, it was evident that Outer Tibet had practically become a dependency of Great Britain. The Dalai Lama remained at the head of the native government.

TICK ERADICATION. See VETERINARY MEDICINE.

TIFFANY, LOUIS COMFORT (1848–). An American artist (see VOL. XXII). He established the Louis Comfort Tiffany Foundation for art students at Oyster Bay in 1918 and gave it a $1,000,000 fund, the income from which was to be used for maintenance and operation. The Foundation consisted of his country home, the Museum, Tiffany Chapel, and over 60 acres of land, and he deeded to it his entire collection of paintings, glass, and other art objects.

TILDEN, WILLIAM T. II. (?–). Tennis player, born at Philadelphia, Pa. He won the national singles championship of the United States from William M. Johnston in 1920 and has retained the title ever since. As a member of the American Davis Cup team his magnificent playing has contributed greatly to the successful defense of the international trophy.

TILNEY, FREDERICK (1875–). An American neurologist, born in Brooklyn, and educated at Yale University and the Long Island College Hospital. In 1903 he settled in New York City and was appointed visiting neurologist to Roosevelt and Bellevue Hospitals He became full professor of neurology at Columbia University in 1914. In addition to numerous contributions on neurological subjects to periodical literature he wrote: *A Study of the Hypophysis Cerebri* (1911); *Morphology and Evolutionary Significance of the Pituitary Body*, with L. F. Warren (1919); *Epidemic Encephalitis*, with H. S. Howe (1920); *The Form and Functions of the Central Nervous System*, with H. A Riley (1920, 1923).

TIMBER. See FORESTRY.

TIN. In 1914, the world production of tin amounted to 116,569 long tons, of which more than one-half came from the Straits Settlements and the Malay Peninsula. In 1917, the tin production for the world was estimated at 128,243 long tons, and from this point there was a decline until 1921, when the world produced but 99,728 long tons. In 1922, the output increased to 128,586 long tons and supplies reached the level of pre-war days. The leading producers in 1922 were the Malay Straits with 35,288 long tons, Bolivia with 31,942 long tons, Banka with 15,922 long tons, Billiton, etc., with 14,500 long tons, China with 12,435 long tons, Australia with 2657 long tons and Siam and India with 6500 long tons.

The most notable tendency in regard to the production of tin was the increase in the exports from Bolivia, which increased from 22,355 metric tons tin contents of ore in 1914 to 32,123 metric tons tin contents of ore in 1922, this being shipped in the form of black tin concentrates, part of which came to the United States and was smelted in American refineries. During the decade the tin-mining industry virtually became extinct in Cornwall, England, after having flourished there for a number of years. The world possessed a large smelting capacity for tin, a substantial portion of it located in the United States, and as a result there was found considerable variation in the imports. Thus in 1912 imports in the United States were 116,003,385 pounds, valued at $50,371,102. In 1914 there was an import of 95,049,612 pounds, valued at $32,861,188; and in 1919 maximum imports of 164,579,905 pounds, valued at $104,588,690. This import declined to 154,201,000 pounds, valued at $46,302,701, in 1922.

In the season of 1920–21 there was a very limited demand for tin, and even on the reduced basis the production exceeded the consumption. Accordingly, various large producers and certain colonial governments decided to enter into an agreement to hold the accumulated supplies rather than sacrifice them on the market, or in other words, form a pool which would be gradually liquidated under favorable circumstances.

TIRES. See MOTOR VEHICLES; RUBBER.

TIROL. A province of the Republic of Austria. Its area in 1910 was 10,301.7 square miles; in 1923, 4882 square miles. Its popula-

tion in 1910 was 946,613; in 1923, 313,699. See AUSTRIAN REPUBLIC; TIROL, GERMAN SOUTH.

TIROL, GERMAN SOUTH. On the possession of this area, made up of the districts of Trentino (area, 2454 square miles) and Alto Adige (area, 2953 square miles) centred a bitter struggle between Austria and Italy, and though Italy emerged victorious in 1919 by gaining the region through the Treaty of St. Germain, subsequent events revealed that it still remained a source of grave conflict. Racial figures reveal the situation. The Trentino, in 1910, seated 13,450 Germans and 360,847 Italians; Alto Adige had 215,796 Germans, 6704 Italians, and 19,605 Ladins (who speak a dialect akin to Italian). Italy's claims, therefore, for frontier rectification north of the Trentino could be based only on strategical grounds. Austrian control of the Alpine passes meant that the plains of Lombardy and Venetia lay always open to a hostile attack, and the easy success with which the Austrian armies had poured into Italy in 1916 gave point to the contention. This consideration had been behind one of the guiding principles of the Italian foreign policy. In the early months of the War, when both sides were exerting all their efforts to gain either Italian adhesion (Allies) or to assure Italian neutrality (Central Powers), a series of conversations was carried on between the Italian and Austrian foreign offices that indicated a readiness on the part of Austria to listen to Italian demands. On Apr. 8, 1915, the proposals of Sonnino called for territorial compensations that included the Trentino and a part of Alto Adige stretching to north of Bozen and cutting athwart the Meran railway from the Brenner Pass. Baron Burian for Austria made two Austrian offers, the second of which offered to cede the Trentino, but halted at the transfer of Bozen. On May 3, stating that an agreement was impossible, Sonnino declared for Italy that the treaty of alliance with Austria was terminated and that henceforth Italy reserved to herself "complete liberty of action." It is interesting to note that a week preceding, on Apr. 26, 1915, Italy had signed with the Allies the secret Treaty of London, by which, for her actual support in the War, she was assured not only the Trentino and Bozen but the whole German South Tirol to the Brenner Pass, including the old German towns of Bozen, Brixen, and Meran and the wholly German-populated valleys of the Oltzthal and the Zillerthal. On this treaty Italy plainly took her stand at the Peace Conference. Regardless of the fact that there were 230,000 Germans in the territory, that the Ladins in October, 1918, had expressed their sympathies as being with the German Tirolese, and that the whole Tirol was a perfect political and economic unit, the Peace Conference finally yielded to the Italian demands and incorporated, substantially, the London line into the Treaty of St. Germain (on May 29, 1919). Thus, in the conflict between Point Nine of President Wilson's Fourteen Points and the matter of treaty obligations, the highly vaunted democratic principles of the War met with defeat. There was widespread disaffection, too, on the part of the smaller powers because Italy, unlike themselves, was not compelled to sign a Minorities Treaty. It was plain that for an Italia Irredenta an Austria Irredenta had been substituted. The events of 1919–24 only served to confirm this fact. On Jan. 20, 1919, the Austrian Tirolese Diet passed a resolution refusing to recognize the cession of South Tirol; in April, 1921, the Austrian Tirolese, realizing that the weakness of their own country might stand in the way of an eventual readjustment, voted for union with Germany. Economically, the leading Tirolese industries of wine and fruit growing were languishing because of the destruction of the former Austrian and German markets. On the other hand, Italy, perversely it seemed, did everything to fan the flame of Tirolese discontent. From April, 1922, on, with the advent of Fascism, the population was subjected to a series of outrages, which, under the Mussolini régime, turned into legal oppression. Italianization of the inhabitants proceeded rapidly in 1923–24: Italian place names were substituted for the universally known German; Italian was prescribed as the official language of public bodies and the courts; Italian officials began to be introduced in completely German-speaking parishes and Austrian railway and postal employees were dropped for Italians; all instruction in elementary schools was being changed to Italian while religious instruction was undergoing the same change (beginning October, 1923). Finally, in 1924, Italians began to confiscate the property of the German citizens residing in the South Tirol, in direct violation of the Treaty of St. Germain. Thus, there was bitterness and want and the development of a deep seated hostility in 1924.

TITANIUM OXIDE. See CHEMISTRY.

TITCHENER, EDWARD BRADFORD (1867–). A leading American psychologist (see VOL. XXII). On the twenty-fifth anniversary of his association with the Cornell University laboratory he was honored with a volume of commemorative *Essays* (1917) written by his former pupils. In 1924 he was preparing *Systematic Psychology,* which was to incorporate the experimental findings of the Cornell laboratory on perception, movement, and the integration of sensational attributes. Besides scientific papers, the only work published by Titchener since 1914 is *A Beginner's Psychology* (1915).

TITTONI, TOMMASO (1885–). An Italian statesman, born at Rome, educated at Naples, Oxford, and Liége. He was elected to Parliament as deputy for Civitavecchia in 1886 and resigned in 1897 to accept the post of prefect of Perugia. He held a similar office in Naples in 1900 and was made a senator in 1902. As foreign minister in the cabinet of Giolitti, he made an effort to bring Italy into closer connection with Austria and also with France. Later, as foreign minister in the Fortis cabinet, he proposed to reduce the duty on Spanish wines; the storm occasioned by this proposal wrecked the cabinet, Dec. 24, 1905. In March, 1906, he was appointed ambassador to London, but in a couple of months he was again called to his former post under Giolitti; this he retained till 1909. In 1910 he was appointed ambassador to France. He declared himself in favor of Italian neutrality in 1914, and after Italy's entry into the War he resigned from the French ambassadorship. Premier Nitti gave him the post of foreign minister in 1919 and that of first delegate to the Peace Conference, but he was obliged to resign in November because of ill health. He was appointed president of the Senate in December, 1919, and later Italian delegate to the Council and Assembly of the League of Nations, but his health

did not permit him to act. His publications include: *Sei Anni di Politica Estera* (1912); *Italy's Foreign and Colonial Policy* (1915); *The Responsibility of the War* (1916); *Conflitti Politici e Riforme Costituzionali* (1919); *Per la Guerra e per la Pace* (1919).

TODD, ARTHUR JAMES (1878–). An American sociologist, born at Petaluma, Cal., and educated at the University of California and Yale University and in Paris and Munich. He was connected with settlement and probation work in San Francisco for several years and in 1911 became instructor in sociology at the University of Illinois. In 1914–15 he was professor and head of the department of the University of Pittsburgh, and from 1915 to 1921, professor of sociology and director of the training course for social and civic work at the University of Minnesota. In 1919 Professor Todd was also visiting professor of sociology at Northwestern University. He was editor for the American Institute of Criminal Law and Criminology and wrote: *The Primitive Family as an Educational Agency* (1913); *Theories of Social Progress* (1918); and *The Scientific Spirit and Social Work* (1919).

TODD, HENRY DAVIS, JR. (1866–). An American army officer, born at Claverack, N. Y., and graduated at the United States Military Academy in 1890. He entered the artillery division of the army and was promoted through the grades until he reached the rank of lieutenant-colonel of artillery in 1913. He commanded the 33d Division from September 18 to Dec. 7, 1917, the artillery supporting the 1st Division in the St. Mihiel offensive, and the 58th Field Artillery Brigade at the Meuse-Argonne battle. He was with the 33d Division in Luxemburg as part of the army of occupation. In August, 1919, on the demobilization of the 33d Division, he entered the General Staff College in Washington. He was made brigadier-general in the Regular Army in 1920 and was assigned to command the coast defenses of Manila Bay on June 3, 1921.

TOGOLAND. Formerly a German protectorate on the coast of West Africa, between the Gold Coast and Dahomey, but since 1919 partitioned between Great Britain and France as mandate territories. It had an area of 33,700 square miles, and a native population of 1,032,000. The whites, on Jan. 1, 1913, numbered 368, of whom 320 were Germans. Lome was the chief port. Products for export were palm kernels and oil, rubber, ivory, and copra, though cotton, coffee, tobacco, and cacao were becoming important. Exports for 1913 were 9,138,000 marks (£456,000) and imports 10,631,000 marks (£531,000). For 1913–14, the budget balanced at 4,057,136 marks and the colony was self-supporting. Railways totaled 204 miles. In 1913 a cable line linked Germany with Togoland, and a wireless station at Kamina was in direct communication with Berlin. German local officials attempted to keep the territory neutral during the War, but the offer was refused and local British and French troops invaded the country. Opposition was slight with the result that the colony was completely occupied in August, 1914. Mandates were granted Great Britain and France by the Supreme Council in May, 1919; in July, 1919, the country was partitioned by both interested parties provisionally, and in September, 1920, permanently. France received the port of Lome and the entire seacoast of 32 miles. Her total area, which is contiguous to Dahomey, is 21,200 square miles, with a population of 672,000. The British mandate, contiguous to the Gold Coast, has an area of 12,500 square miles, and a population of about 200,000. Under the British and French the two zones were made self-supporting. Revenues for 1918, for both, were £127,444 and expenditures £118,953. The British zone was attached to the Gold Coast; the French to Dahomey, pending the issue of definite mandates. The country, under the new administration, rapidly regained its stability so that trade for 1919 surpassed the 1913 figures. Imports for the whole in 1919 were £665,332, and exports £850,744. In 1921, imports to the British area were £34,000 and exports from it £46,000. In the French area for 1921 these were 10,918,270 francs and 6,129,677 francs. The most important recent development was the growth of the cotton and cocoa crops. The three railway lines of 204 miles were all in the French territory. In 1923, the French administration took measures against slavery and the use of alcohol and narcotics among the natives.

TOLEDO. The third city of Ohio and the third railroad transportation centre of the United States. The population increased from 239,905 in 1914 to 283,000 in 1924. Toledo's 671 manufacturing industries are so diversified that the great development in the decade 1914–24 can be attributed to no special group, although the manufacture of automobile accessories and equipment has played an important part. Toledo is the world's leading city in soft coal shipments and the centre of the metal wheel industry. The area of the city increased 6 square miles. The assessed value of property was almost doubled in the decade 1914–24. The bonded debt was increased from $9,732,577 to $18,591,244. The tax rate was advanced to take care of improvements and to provide facilities. The Summit Street extension, to link up the South Side by a direct route to the business section, was completed. The Art Museum, costing originally $850,000, a gift from E. D. Libbey, was outgrown and in 1924 was being doubled in size through another gift from Mr. Libbey. The sewerage system was increased by 41 miles to provide intercepting sewers and pumping station. The street railway company was operating under a service-at-cost plan. Bank deposits increased from $50,563,338 in 1914 to $137,000,000 in 1924. There was under construction in 1924 a Safety Building to house Police and Fire Department headquarters, at a cost of approximately $1,000,000. Building in the city's business district received a tremendous stimulus in 1924, and a survey showed that construction estimated at $40,000,000 was in progress. The public school system expanded greatly in the decade. In 1924 there were 41,000 pupils. In ten years, $6,500,000 was spent on buildings, including a million-dollar high school to match the two constructed in 1913. The Great Lakes–St. Lawrence Waterway will establish Toledo as the leading port of the Great Lakes in ocean shipments.

TOLEDO, UNIVERSITY OF THE CITY OF. A municipal institution at Toledo, Ohio, founded in 1872. The student enrollment increased from 1147 in 1918 to 1506 in 1923, the faculty from 30 to 66 members and the library from 4558 to 11,057 volumes. The annual income rose from $145,000 to $174,000. A new science building was completed in 1921 and a department of ele-

mentary teachers' training was established in 1922. President, A. Monroe Stowe, Ph.D.

TOLLER, ERNST (1893–). A German dramatist, born at Samitschin. He attended college at Bromberg, studied at the universities of Heidelberg, Munich, and Grenoble and entered politics in 1918. He was second chairman of the council of workingmen, soldiers, and peasants during the revolution in Munich (1919) and was condemned for his participation to five years' imprisonment in the fortress of Niederschönfeld. There he wrote the plays which have profoundly stirred audiences in Germany: *Wandlung* (1919); *Masse Mensch* (1921); *Die Ludditen* (1921); and *Der Deutsche Hinckemann* (1922). He has also written some verse.

TOLMAN, RICHARD CHACE (1881–). An American chemist, born at West Newton, Mass., and educated at the Massachusetts Institute of Technology, where he was a Dalton fellow. He also studied at Berlin and Crefeld. He was an assistant and instructor at the Massachusetts Institute of Technology (1907–09) and a research associate (1909–10). In 1911 he became assistant professor of chemistry at Cincinnati University and in 1912 accepted a similar appointment at California University. In 1916 he became professor of physical chemistry at Illinois University. At the beginning of the War he was made chief of the dispersoid section of the Chemical Warfare Service with the rank of major and in 1919 was made associate director of the fixed nitrogen research laboratory of the Ordnance Bureau of the United States Army, of which he became director in 1920. His early investigations had to do with colloids, ionization, and similar subjects in physical chemistry. He later investigated the behavior of smokes and reactions of nitrogen compounds. In addition to various minor publications, he is the author of *Investigations on the Relativity of Motion* (1917).

TOLMINO. See WAR IN EUROPE, *Italian Front.*

TOMMASINI, VICENZO (1880–). An Italian composer, born in Rome. He studied there under Pinelli (violin) and Falchi (composition) and later under Max Bruch in Berlin. He is one of the few living impressionists who have not yet crossed the border-line into futurism. He wrote the operas *Medea* (Trieste, 1906), *Amore di Terra Lontana* (not produced), and *Uguale Fortuna* (Rome, 1913); a ballet on themes of Scarlatti, *Le Donne di Buon Umore* (Rome, 1917); the symphonic poems, *Poema Erotico* and *Il Beato Regno;* a prelude to *L'Hymne à la Beauté;* a suite and *Chiaro di Luna* for orchestra; two string quartets and a violin sonata; choruses à cappella; songs; and piano pieces.

TÖNDER. See SCHLESWIG.

TONGO, OR FRIENDLY ISLANDS. See PACIFIC OCEAN ISLANDS.

TONKING. See FRENCH INDO-CHINA.

TORONTO, UNIVERSITY OF. An institution founded in 1827 at Toronto, Canada, consisting of seven faculties with four arts colleges, supported by the provincial government. The student enrollment in 1914 was 4000, compared with an enrollment of 5044 in the year 1922–23. The figures varied in the years between, reaching their lowest owing to the War in 1918 with a registration of 2296, and their highest in 1922 with a registration of 5349 due chiefly to returned soldiers. The faculty was increased during the decade fom 453 to 621 members, and the library from 138,658 bound volumes and 46,648 pamphlets, to 187,426 volumes and 63,327 pamphlets. The income also increased from $936,727 in 1914 to $1,932,700 in 1923. The Rockefeller Foundation after 1921 had been giving annually the interest on $1,000,000 for the development of the faculty of medicine. Trinity College was under construction in 1923–24. President, Sir Robert A. Falconer, K.C.M.G., M.A., LL.D., Litt.D.

TORPEDO BOAT. See VESSEL, NAVAL.

TORTS. See LAW, PROGRESS OF THE.

TOTEMISM. See ANTHROPOLOGY.

TOURET, FRANK HALE (1875–). An American Protestant Episcopal bishop, born at Salem, Mass., and educated at Harvard University and the Episcopal Theological Seminary. In 1903 he was ordained to the Protestant Episcopal priesthood and was curate of churches in Providence, Troy, and Colorado Springs until 1908, when he became rector of St. Luke's Church in Fort Collins, Colo. From 1910 to 1917 he was director of Grace Church in Colorado Springs and in 1916 was elected bishop of the Missionary District of Western Colorado. He was elected bishop of Idaho in 1919.

TOVEY, DONALD FRANCIS (1875–). An English composer, born at Eton. He was a private pupil of S. Weisse (piano), Sir W. Parratt (counterpoint), and J. Higgs (composition). From 1906 to 1912 he gave several of his own works at chamber music concerts (The Chelsea Concerts) in London. In 1914 he was appointed Reid Professor of Music at the University of Edinburgh, where, in 1917, he established the Reid Symphony Concerts. He contributed numerous articles on music to the eleventh edition of the *Encyclopædia Britannica* and also to its supplement. As a composer he shows decided preference for chamber music, in which field he produced a piano quintet, a piano quartet, a 'cello sonata, a clarinet sonata, two string quartets, and three trios. He also wrote a symphony; a suite for string orchestra; a piano concerto; incidental music to Maeterlinck's *Aglavaine et Sélysette;* church music; and piano pieces. An opera, *The Bride of Dionysus,* although published, had not yet been produced in 1924.

TOWNER, HORACE M. (1855–). A governor of Porto Rico, born at Belvidere, Ill., and educated at the University of Chicago. He was admitted to the bar in 1877 and after practicing law for some years became judge in the third judicial district of Iowa. From 1911 to 1923 he served continuously in Congress, and although he was elected for another term in 1923, he resigned to accept the post of Governor of Porto Rico, for which his service as chairman of the Congressional Committee on Insular Affairs had especially prepared him.

TOWN PLANNING. See CITY PLANNING.

TOWNSHEND, CHARLES (VERE FERRERS) (1861–1924). A British soldier, commander-in-chief of the Mesopotamia campaign in the War (see VOL. XXII). Although he failed in his attempt to reach Bagdad and was made a prisoner at Constantinople, the Turks, when they saw that War was going against them, gave him the opportunity to help the Allies and at the same time to gain his freedom. He afterward told how he walked from a meeting with the Turkish cabinet, with the edict for the opening of the Dardanelles in his pocket, a free

man. General Townshend resigned from the army in 1920 after 40 years of service He published *My Mesopotamia Campaign* (1920). He died in 1924.

TRACKLESS TROLLEYS. See MOTOR VEHICLES.

TRACTOR. See FARM TRACTOR.

TRADE COMMISSION ACT. See TRUSTS.

TRADE UNIONISM. The history of trade unionism during 1914–24 may roughly be divided into three periods, the stagnation during the War, the tremendous expansion in the years after the Armistice, and the relative decline in the succeeding few years due to the industrial depression resulting from the War and the peace treaties. For some years before the War, trade unionism had been steadily growing in most countries. The War brought this growth to a sudden halt. The International Federation of Trade Unions and the Trade Internationals ceased to exist and international relations among trade unionists were in abeyance. The effect of the War on trade unionism was, however, by no means uniform in the various countries. While in some countries, as in Germany, trade unions lost in membership and influence, other countries, like Great Britain and the United States, saw a steadily growing development of organized labor. The postwar period witnessed an immediate rebirth of international trade unionism as well as an unprecedented increase in the membership of the labor organizations of practically all countries, although where such increase had been due to war prosperity the membership fell off again once the after-effects of the War made themselves felt. But in general trade unionism had far more strength in 1924 than it had in 1914. The total number of trade unionists in the world had at least doubled within the 10 years. As for mode of organization, the trade or craft union still remained the standard. With the appearance of new industrial problems, however, and with the increasing hold which the idea of industrial democracy had obtained in one form or another on the imagination of the worker, industrial unionism had made rapid progress, although it was still more a potentiality and an aim than an actual system of organization. The industrial world which confronted the trade unionist of 1924 was more complex than it was in 1914. New industrial problems had come to the fore and with them new attempts at solution. The various forms of industrial democracy (q.v.), which had been advanced and in some cases applied, were entirely a product of the decade, and they had taken different shape in the various countries. Another important development was the spread of syndicalism (q.v.), not only in strictly syndicalist labor organizations, but also within the rank and file of orthodox craft unions. See HOURS OF LABOR; LABOR ARBITRATION; LABOR BANKS; LABOR LEGISLATION.

International Trade Union Organizations. The most important trade union international before the War was the International Federation of Trade Unions with headquarters at Amsterdam. In 1912 it had a membership of 7,394,461, representing 19 countries. It was a rather loose organization and went to pieces immediately at the outbreak of the War. During the War an Inter-Allied Trade Union Conference was held at Leeds in 1916 and a Central Powers and Neutral Conference was held at Berne in 1917. Although both conferences and the three labor bureaus at Amsterdam, Paris, and Berlin made attempts to revive some sort of international labor activity, the International Federation of Trade Unions was as dead as the Socialist International. After the War, at the conference at Amsterdam in July, 1919, the old International was reconstructed, although in 1924 it was in reality a new organization. It was an alliance of national trade union federations and trade internationals or, as they are commonly termed, international trade union "secretariats." Its objects were the promotion of the interests of the organizations affiliated with it and of the trade union movement in countries not affiliated with it, the promotion of combined action on all questions of trade union interest, the prevention of international blacklisting, and the provision of funds for these purposes. In July, 1920, the International declared a boycott of the White government in Hungary, which 20 days later had to be abandoned as unsuccessful. The American Federation of Labor had been one of the constituent organizations which formed the International in 1920. Because of the close alliance between the International Federation of Trade Unions and the Socialist International, Samuel Gompers denounced the former as Socialist and the A. F. of L. withdrew in the autumn of 1921. In May, 1924, the advisability of a reaffiliation of the A F. of L. with the International was under discussion. The total membership of the new International at the time of its formation was about 24,000,000. Due to the heavy losses in the membership of the British, Italian, French and other affiliated organizations and to the withdrawal of the A. F. of L., the membership sank to 18,923,931 at the end of 1922. The International Federation of Working Women, established at Geneva in October, 1921, having a membership of 3,500,000 in December of the same year, was an organization independent of the International Federation of Trade Unions, but had the friendliest relations with that body and accepted its principles. Apart from the great International, but affiliated with it, there existed also 28 Trade Internationals or international "secretariats," each one of them comprising the workers within a single industry. Their combined membership in 1922 was a little over 18,000,000. The International Federation of Christian Trade Unions claimed in 1922 over 3,000,000 members. Because of the moderate tendencies of the great International, the International Council of Trade and Industrial Unions or Red International of Labor Unions was formed in July, 1920, by representatives of the All-Russian Trade Unions' Central Council, and a group of communist and syndicalist national federations, and the Executive Committee of the Third International, "to act as a militant international committee for the reorganization of the trade union movement. As may be surmised, this organization was in close connection with the Third International for the purpose of joint action. It carried on an active campaign against the International Federation of Trade Unions, whose methods it termed "yellow" Figures given out on the occasion of its Second Congress, Moscow, December, 1922, and purporting to be complete statistics, claimed the affiliation of 32 countries and a membership of 12,274,000, of which, however, 7,914,000 fell to the share of Russia. For the Syndicalist International see SYNDICALISM.

United States. American trade unionism is

confronted with specifically American conditions and difficulties which preclude a development along European lines and give the American labor movement a distinct character. In spite of these obstacles, however, American organized labor advanced very far during the 10 years. From 1914 onward American public opinion changed its attitude toward organized labor, coming to accept it as a legitimate expression of American democratic ideals. The active support which organized labor gave to the government in the prosecution of the War increased its prestige greatly. It benefited materially from the war prosperity as well as from the relative absence of the competition of immigrant labor during the War. With the close of the War, however, unemployment arrived and gave labor a decided setback. An offensive for the "open shop," which reached its most intensified form in the great steel strike of 1919, was carried on by the employers' organizations and did serious harm to American trade unionism. Another blow to labor was the settlement of the Coronado Case in 1922. The verdict pronounced the liability of trade-union funds for damages in case responsibility had been established. The new movement for industrial democracy found its chief expression in the United States in the Plumb Plan, a scheme sponsored by the railway unions for tripartite control of the railroads by the State, the owners, and the workers. There was a big increase in the number of trade unionists between 1914 and 1924. Perhaps the outstanding event, however, in the American labor movement during that period was the successful organization of the sweated workers in the needle trades into such powerful bodies as the Amalgamated Clothing Workers of America and the International Ladies' Garment Workers' Union and the formation of other groups such as the Amalgamated Textile Workers, the Amalgamated Food Workers, and the American Federation of Teachers.

American Federation of Labor. This organization, comprising most of the trade unionists in the United States and many of those in Canada, counted a great increase in its membership, 1914–24, although the later years of industrial depression cut in on this advance. From 2,020,671 in 1914 the membership rose steadily to 4,078,740 in October, 1920, after which it showed a falling-off. At its Portland Convention in October, 1923, the A. F. of L. reported a membership of 2,926,468. The organization was strictly a federation of craft unions, in spite of the fact that its largest affiliated body, the United Mine Workers of America, with a membership of 400,000, was an industrial union and that there existed within its ranks an active minority in favor of industrial unionism, which, in 1918, led the A. F. of L. into its unsuccessful policy toward unionization of the steel workers and brought about the great steel strike of 1919 with its decisive victory for the "open shop." The A. F. of L., being conservative in policy, did not appeal to the unskilled worker. This conservative tendency manifested itself, aside from the withdrawal from the Amsterdam International, in its consistent opposition to the formation of an American Labor party and in its friendly relationship with the American Legion. The authority of the official element led by President Gompers and the rigid central control had so far been able to keep down the radical elements, although in the last years of the decade a steadily growing opposition with new tendencies had appeared. This became apparent in the Montreal Convention in 1920 when a resolution for government ownership of railroads and inland waterways with democratic control was adopted in spite of Gompers's opposition.

Next to the A. F. of L. the four railroad brotherhoods, with a membership of 400,000, were of foremost importance in the American labor movement. They made handsome gains during the War and, although conservative in character, were more progressive than the A. F. of L. They were the sponsors of the Plumb Plan and showed sympathy for separate political representation of labor. The needle-trade unions are perhaps the most wide-awake labor organizations in the United States. During the 10 years they changed materially the working conditions in their industry and won important concessions for their members. They were socialist in tendency and showed most active sympathy for the struggles of the other workers in the United States. Their membership was approximately 285,000.

Great Britain. British trade unionism made important numerical gains after 1914. Its membership rose from 3,918,809 in that year to 8,023,761 in 1919. In the following years, however, the membership fell to about 5,000,000 or 40 per cent of the wage earners, as a result of post-war conditions and unemployment. The Trade Union Congress, the national organization of the British trade union movement, reported 2,866,077 members in 1914; 6,505,482 in 1920; and 4,352,818 in 1923. Far more significant than their numerical increase was the growth of the influence of the British trade unionists, which may be measured by the fact that in 1924 the Labor party, which is primarily the political expression of British trade unionism, became the governing party. Another feature of this great development was the tendency to form large labor aggregations. The movement for "less unions and more unity" through amalgamation brought the majority of the British trade unionists into relatively few and large bodies, such as the Miners' Federation (750,000 members), the National Union of Railwaymen (327,000), the General Labor Union (500,000), the Amalgamated Transport Workers (1,000,000), the Amalgamated Engineering Union, and the United Textile Factory Workers' Association. At the outbreak of the War, British labor agreed to a general truce between labor and capital. At the famous Treasury Agreement of 1915 the trade unions through their officers, with the exception of the Miners' Federation, abrogated their trade-union rights and agreed to compulsory arbitration. This agreement was given legislative force for the trades concerned with the supply of munitions in the Munitions of War Act of 1915. Under the increasing hardships of the War, however, sections of the rank and file grew restive, felt that they had been betrayed by their leaders, and expressed their revolt through a number of unofficial strikes. This revolt of the men against their leaders culminated in the shop stewards' movement and in the strikes on the Clyde during 1916 and 1917, and threatened at times to disrupt the old form of trade-union organization. The miners, who had not abrogated their freedom to act, showed an independent attitude throughout the War. The rebellious spirit of British labor manifested itself also through the widespread acceptance of

various theories of industrial unionism, syndicalism, and industrial democracy. The establishment of Whitley Councils in various trades by the government was a concession to this spirit This unrest did not abate with the Armistice. Guild socialism (q.v.) spread in the years after the War and the miners made their demand in 1919 for the nationalization of mines which resulted in the Coal Commission and the Sankey Report. In 1920, at the time of the Russo-Polish conflict, the trade unions formed councils of action and by this direct method exerted successful pressure on the British government in favor of nonintervention. In the later years, as a result of the after effects of the War, British labor went through a severe crisis of unemployment, which cut sharply into the membership of the trade unions and decreased their power of action. The outstanding single event of the postwar period and the most severe blow to British labor was the failure of the miners' strike in 1921 and the resultant breakup of the Triple Alliance, the most powerful single labor organization in the world.

Germany. The German trade-union movement is undoubtedly the largest and most influential national labor movement. The German Republic could not last without its consent, as became clearly apparent in 1920 when the German trade unionists by a general strike brought to nought the otherwise successful Kapp Putsch. During the War, German trade unionism was stagnant, but after the War it increased by leaps and bounds until, in 1924, there were about 12,000,000 trade unionists in the country. The largest organization was the General Federation of German Trade Unions with a membership of 7 874,000. It is affiliated with the Amsterdam International, as is also the Federation of Unions of Salaried Employees, with a membership of 640,000. The Federation of Christian Trade Unions, and the Federation of Unions of Christian Salaried Employees, with a combined membership of 1,500,000, were affiliated with the International Federation of Christian Trade Unions. The Federation of Civil Servants was a postwar development and had 1,500,000 members. The Union of Hand and Brain Workers with 320,000 members adhered to the Red International of Labor Unions. See SYNDICALISM.

TRAIN. See ARMIES AND ARMY ORGANIZATION.

TRAIN, ARTHUR (CHENEY) (1875–). An American lawyer and writer, born at Boston, Mass., and educated at Harvard University and its law school. He practiced for several years in New York and from 1901 to 1908 was Assistant District Attorney, a position in which he served again in 1914–15. He was a fiction writer of considerable talent, his books including: *The Man Who Rocked the Earth* (1915); *The Earthquake* (1918); *Tutt and Mr. Tutt* (1920); *The Hermit of Turkey Hollow, By Advice of Counsel,* and *As It Was in the Beginning* (1921); *Tut, Tut, Mr. Tutt!* and *His Children's Children* (1923).

TRANSCAUCASIAN SOVIET REPUBLICS, FEDERATION OF. See RUSSIA; ARMENIA; AZERBAIJAN; GEORGIA.

TRANSFORMERS. See ELECTRIC POWER TRANSMISSION AND DISTRIBUTION.

TRANSJORDANIA, EMIRATE OF, or KERAK. A territory, inhabited by Arabs, lying to the east of the Jordan and to the north of the kingdom of Hedjaz. Area, undetermined; population, estimated at between 300,000 and 500,000, mostly Arabs and Moslems, though there were about 30,000 Christians. Amman, the capital, had 2300 inhabitants. Other towns are Kerak (2500), Es Salt (8000), Ma'an (3000), Madeka (2000), Jerash (1500). The country is for the most part desert, except for the 30-mile district between the Jordan and the Hedjaz railway. The population being nomadic largely, pastoral pursuits were the leading activity. Phosphate deposits have been found, as well as potash, in the Dead Sea. Communications were maintained by a motor road from Amman to Jerusalem and by the portion of the Hedjaz railway running through the country from Daraa to Ma'an. The estimated revenue for 1922–23 was £204,000; the British grant-in-aid, £100,000. The country played a prominent part in the Crusades, then with the defeat of the Christians fell to a series of independent rulers who came out of Egypt. Under the Ottoman Turks (1517–1918) its part was an obscure one until the building of the Hedjaz railway made it easily accessible. In April, 1918, it was invaded by the Emir Faisal, and by the Peace Treaty it was made part of the Palestine mandate under the supervision of the British high commissioner. Emir Faisal, as ruler of Syria, was recognized as sovereign in Transjordania, but after his fall, his brother, the Amir Abdullah, was set upon the throne (April, 1921). In May, 1923, local autonomy was formally granted the Territory by the British high commissioner in Palestine. That Arab dissatisfaction was widespread, however, was indicated in September, 1923, when demands were made for a parliamentary government and the expulsion of the Europeans. See PALESTINE.

TRANSMISSION AND DISTRIBUTION, OF ELECTRIC POWER. See ELECTRIC POWER TRANSMISSION AND DISTRIBUTION.

TRANSPORT. See VESSEL, NAVAL.

TRANSPORT SERVICE, UNITED STATES NAVAL. See WAR IN EUROPE, *Naval Operations.*

TRANSVAAL PROVINCE. See SOUTH AFRICA, UNION OF.

TRANSYLVANIA. Before the War an integral part of Hungary, but since December, 1918, a Rumanian province. Area, 22,312 square miles; population in 1910, 2,678,367. Cluj (Klausenburg), the principal city, had an estimated population of 65,500 in 1920. The inhabitants in 1910 were divided racially as follows: 55 per cent Rumanian, 34.3 per cent Magyar (known locally as Szeklers), 8.7 per cent German (i.e. Saxons). There were also some Ruthenians and Slovaks. Among all these the Jews numbered about 65,000. The people pursued for the most part agricultural and pastoral activities, the industrial life occupying only a small place. The Rumanians were chiefly peasants, herdsmen, and hillsmen, largely illiterate, and culturally and economically completely dominated by their Magyar overlords. Klausenburg, the capital, was the centre not of Rumanian, but of Hungarian intellectual life. The limit of Transylvania, on the edge of the Rumanian Forelands, coincided with a number of important towns in the Banat, i.e. Arad, Temesvár, and Nágy Varad, and it was to gain these towns, so important as focal points to the surrounding agricultural country, that Rumania sought the inclusion of the Banat (q.v.) in her territories. On Dec. 2, 1918, a Transylvanian Assembly, perceiving how imminent was the disruption of the Dual Monarchy, declared its

union with Rumania. The Saxons acceded; the Magyars, sensing their racial submergence, refused their allegiance until well into 1921. On Jan. 11, 1919, Rumania by royal decree annexed the territory; the subsequent treaties confirmed the transfer. In 1920, the Transylvanian national council was dissolved and a provincial government was erected. Transylvania was represented by 45 senators and 112 deputies in the Rumanian parliament. The leading problem here, as in all the Rumanian lands, was that of racial minorities. That the Rumanians had no intention of treating the Magyars tenderly was shown, beginning with 1919, when they proceeded to expel large numbers of Magyar landlords, ostensibly in the interest of land reform. Here, so soon, was appearing a new irredentism in the heart of the once Rumania Irredenta. See WAR IN EUROPE, *Balkan Front*.

TREATY OF LONDON (APR. 26, 1915). See WAR, DIPLOMACY OF THE.

TREES. See FORESTRY.

TRELEASE, WILLIAM (1857–). An American botanist, born at Mt. Vernon, N. Y., and educated at Cornell, Harvard, Michigan, and Washington Universities. After serving as lecturer at Johns Hopkins University, he became instructor in botany at the University of Wisconsin (1881–85). He was then appointed professor of botany in Washington University and in 1913 professor of botany at the University of Illinois. From 1889 to 1912 he was director of the Missouri Botanical Garden. Professor Trelease wrote: *The Genus Phoradendron* (1916); *Plant Materials of Decorative Gardening* (1917); *Winter Botany* (1918); and many papers and reports on botany and entomology.

TRENCHARD, SIR HUGH MONTAGUE (1873–). A British air marshal. He entered the army in 1893, served through the South African War, and afterward took part in three campaigns as a member of the West African Frontier Force, receiving the D. S. O. in 1906. He became an assistant commandant of the Royal Flying Corps at Upavon in 1912. Before the end of the first year of the War he was made head of the military wing of the air forces under Sir J. French, in which office he was markedly successful. By 1917 he had reached the rank of major-general, and when the air ministry was formed in the same year he went back to England as chief of staff. He resigned in April, 1918, and shortly afterward was given the command of the Independent Force and raided German territory during the last months of the War. In 1919 he was made air marshal and became chief of the air staff.

TRENCH WARFARE MATERIAL. Trench warfare was a development peculiar to the War in Europe. The line of battle extended from the English Channel to Switzerland, its flanks resting on militarily impregnable obstacles which precluded outflanking. The numbers engaged made the battle lines practically continuous, reduced the chance of success of a war of manœuvre, and eventually resulted in the deadlock inevitable to a war of position when the opposing forces are evenly matched. A recurrence of trench warfare of the sort experienced in the War will depend on the likeness of the conditions of any future conflict to those just described. The possibility of similar conditions being encountered is considered so slight that little attention is being paid to improvement of devices which find effective employment only during a war of position. The state of the art, therefore, was in 1924 practically the same as at the signing of the Armistice. See ORDNANCE.

Grenades. The modern grenade is in effect a small explosive shell thrown at the target by the soldier with his good right arm or by means of an attachment (tromblon) fastened to the muzzle of his rifle. The so-called defensive grenade consisted of a gray-iron casting, the grenade body, which contained an explosive charge of nitrostarch and a suitable firing mechanism designed to prevent explosion until the thrown grenade was a safe distance from the thrower. The defensive grenade was intended to burst into fragments and was used only by men actually within the trenches, the walls of which would protect the thrower from flying fragments. This fragmentation type of grenade was the most used and the most useful of all developed during the War. An American contribution to trench warfare was the offensive grenade, the body of which was made of paper which produced its deadly effect by the flame or concussion of the explosive itself. This type was safe to use in open offensive movements since there were no fragments of metal to fly back and injure the thrower. Gas grenades, the bodies of which consisted of two sheet-metal cups welded so as to be gas-tight, were under development and were used principally to make the enemy trenches and dugouts uninhabitable on release of their toxic contents.

Phosphorus grenades, of construction similar to the gas type, were used to scatter burning phosphorus over an area 10 to 15 feet across. The dense cloud of white smoke thus produced was utilized to build smoke screens for the protection of troops in open attack on machine-gun nests. Incendiary grenades were essentially paper bombs filled with highly inflamable material and intended for use in destroying structures by fire. In still another class was the Thermit grenade, consisting of a terne-plate container filled with Thermit, a patented composition which developed an intense heat while melting. These grenades found their principal use in destroying captured guns which could not be moved, by fusing the breech mechanism to an extent preventing further use. A combination mount and rifle grenade was also developed by the British and later adopted by the United States Army. The great majority of rifle grenades were of the French Viven-Bessière type, provided with a hole extending entirely through the middle of the grenade. In order to use this grenade a specially-designed holder is fitted to the muzzle of an ordinary service rifle. When the rifle is fired, the bullet passes through the hole in the grenade and the discharged gases following the bullet have enough energy left to throw the grenade approximately 200 yards. The rifle grenade was used both as a defensive and an offensive weapon, since the firers were well out of range of the exploding missile, which had an effective radius of nearly 75 yards on burst.

Trench Mortars. The trench mortar, in its simplest form, consisted merely of a seamless drawn-steel tube three inches in diameter, closed at one end and provided with a projecting firing-pin at the closed end. A simple bipod, which with the tube itself constituted a tripod, gave elevation and direction to the tube. In action, a very simple form of projectile consisting of a lap-welded 3-inch steel tubing, filled with nitrostarch explosive and provided at its lower end

with means for attaching an ordinary shot-gun shell, was dropped gently down the muzzle. When the primer of the shot-gun shell struck the projecting firing-pin at the bottom of the closed tube, the cartridge was discharged, and the shell was thrown with considerable velocity in a high arc for several hundred yards. In order to obtain greater range, rings of black powder in muslin bags were wrapped around the shot-gun shell and were ignited on its discharge. Light vanes, added in prolongation of the shell body, surrounded the shot-gun shell in order to prevent tumbling of the projectile in fire. This material was indeed ordnance reduced to its simplest terms, but due to the simplicity of design and ease of manufacture, the readiness with which troops could be trained in its employment, and its adaptability to the peculiar conditions of trench warfare, it found an enormous use. Three-inch and four-inch Newton-Stokes mortars of British design, in general conformity to the above description, were used to a great extent by the American Expeditionary Forces. Provided with more accurate elevating and traversing mechanism and separate propelling charges, six-inch Newton-Stokes and French 24mm. mortars were also used to a considerable extent. See STRATEGY AND TACTICS, MILITARY.

The Livens projecter, of British design, was essentially a long steel tube, closed at one end, intended to be buried in the ground, and supported by a pressed steel base plate. These tubes were set up in groups of 25 or multiples thereof and were fired simultaneously by electricity, sometimes to the number of 2500. The projectile used was a gas drum cylindrical in shape, about 24 inches long and eight inches in diameter; and when fired in large numbers, it worked great havoc in the ranks of the enemy. Although the British used this type with great success throughout the latter period of the War, and the French and Americans also adopted it and used it freely, the Germans were never able to discover the nature of the device which was causing such damage and were never able to produce anything similar to it.

Pyrotechnics. Pyrotechnics found very extensive use in the War. The exigencies of trench warfare frequently demanded the transmission of orders and information simultaneously by several different methods. In order to supplement the telephone, telegraph, and visual signaling, fire signaling was resorted to, and pyrotechnic devices were developed to meet all needs, including signal rockets, parachute rockets, signal pistols and their ammunition, position and signal lights, flares, smoke torches, and lights to be thrown by the Viven-Bessière tromblon, the French device attached to the end of the rifle in which a rifle grenade fits.

Pyrotechnics won themselves a reputation as a dependable means of communication when all other means, except by runners, were interrupted, and it is probable that they will find a continuing place in the liaison systems of all armies. After the War, considerable attention was devoted to producing pyrotechnic signals which would be entirely dependable as to functioning, could stand rough handling, and would not deteriorate after storage under field conditions. Airplane flares, to be dropped from aircraft for the illumination of No Man's Land, have been developed since the War to give a candle power of 400,000 and a burning-time of seven to eight minutes, with a larger size having a candle power of 800,000 and a burning-time of four minutes. Wing-tip flares giving a candle power of 10,000 and burning-time of one minute have also been developed for use by aviators attempting to make forced landings at night or on fields not otherwise illuminated.

TRENGGANU. See MALAY STATES, NON-FEDERATED.

TRENTINO. See TIROL, GERMAN SOUTH; WAR IN EUROPE, *Italian Front.*

TRENTON. A manufacturing city, the capital of New Jersey. The population increased from 96,815 in 1910 to 119,289 in 1920, and to 127,390 by estimate of the Bureau of the Census for 1923. A high school and a grade school were built between 1914 and 1924; another high school costing $1,250,000 was under construction in 1924. A comprehensive zoning ordinance was prepared and public hearings held prior to its adoption. The assessed valuation of the city rose from $69,948,350 in 1914 to $137,263,001 in 1924, capital invested in manufacturing from $55,535,000 to $108,000,000, and the value of the finished product from $53,588,000 to $125,000,000.

TREVES, SIR FREDERICK (1853–1923). A British surgeon (see VOL. XXII). During the War he was president of the Headquarters Board at the War Office and a member of the Advisory Board of the Army Medical Service. His *Surgical Applied Anatomy* passed through its seventh edition in 1918. His chief contribution to literature since 1914 is a book of reminiscences, *The Elephant Man* (1923).

TRIANON, TREATY OF THE. See PEACE CONFERENCE AND TREATIES.

TRIESTE. See FIUME-ADRIATIC CONTROVERSY.

TRINIDAD. An island in the West Indies north of the mouth of the Orinoco, constituting with the island of Tobago (114 square miles) a British colony. Area of Trinidad, 1862 square miles; population in 1911, 333,552; in 1922, 374,650. In 1922 there were 121,249 East Indians in the colony as compared with 110,000 in 1911. The largest city, Port of Spain, had 61,531 inhabitants in 1921 (60,000 in 1911). In 1920, Trinidad was chosen as the seat of a West Indian agricultural college. The leading products continued to be the following, as indicated by export values in 1922: cacao, £1,342,331 (1913, £1,403,379); sugar, £1,145,278 (1913, £418,067); asphalt, £339,824 (1913, £230,565); coconuts, £77,420 (1913, £85,369); petroleum, £472,767 (1913, £75,020). The last made great advances in 1914–24. During 1922, 85,566,303 gallons of crude oil were exported; in 1923, this was increased to 106,804,098. Imports for 1913 were worth £2,828,550; for 1920, £8,490,232; for 1921, £6,903,694; for 1922, £4,604,880. Exports for the same years were £3,065,863, £8,408,611, £4,683,988, £4,229,403. Transhipments for the same years were £2,139,810, £1,077,934, £509,988, £612,527. The United States trade with Trinidad in 1923 was: exports to, $4,394,054 (1915, $3,971,000); imports from, $5,161,979 (1915, $6,739,000). In 1922 there were 123 miles of railway as compared with 95 in 1914. Government accounts follow for 1922 (1913–14 figures in parentheses): revenue, £1,661,607 (£970,789); of which customs was £525,723 (£433,276); expenditure, £1,939,215 (£951,962); public debt, as for Dec. 31, 1922, £3,452,424 (£1,476,615). There were no changes in administration.

TRINITY COLLEGE. An institution for the higher education of men at Hartford, Conn., founded in 1823. The enrollment in 1914 was 248; in 1923, 260. The faculty numbered 27 in 1914 and 30 in 1923, and the library was increased from 70,000 to 100,000 volumes. The productive funds in 1923–24 were $2,300,000. The library and administrative buildings, the gift of J. P. Morgan, were completed in 1914, and a gift of $150,000 was received by the college from the J. P. Morgan fund in 1917. In 1923 the centennial celebration was held, and the centennial fund of $1,000,000 was completed. The Rev. Remsen Brinckerhoff Ogilby, LL.D., succeeded the Rev. F. L. Luther, LL.D., as president in 1920.

TRINITY COLLEGE. A Roman Catholic institution for women founded in 1865 at Washington, D. C., by the Sisters of Notre Dame of Namur; it is affiliated with the Catholic University of America. The number of students increased from 166 in 1914 to 380 in 1924, the number of members in the faculty from 26 to 50, and the volumes in the library from 16,000 to 29,000. The Stewart estate adjoining the campus was bought in 1915. A building and endowment fund was undertaken in 1924. Sister Raphael, A.B., M.D., succeeded Sister Catherine Aloysius, A.B., as president.

TRINITY COLLEGE. An institution in Durham, N. C., founded in 1851. The student enrollment increased more than 57 per cent, from 671 in 1914 to 1058 in 1924, not including a summer term established in 1919 and enrolling, in the summer of 1923, 371. The faculty membership increased 185 per cent in the same period, from 49 to 140; and the endowment approximately 100 per cent, from $1,590,316 to $3,063,896. The number of volumes in the library rose from 60,882 to 105,808. The annual income mounted from $101,806 to $300,898, and the value of the buildings from $503,000 to $875,537. President, William P. Few, Ph.D., LL.D.

TRIPLE ALLIANCE. See WAR IN EUROPE.

TRIPLE ENTENTE. See WAR IN EUROPE.

TRIPOLITANIA. See LIBYA.

TROELTSCH, ERNST D. (1865–1923). A German religious philosopher, born at Augsburg, and educated at the leading German universities. He was called to a professorship in the University of Berlin in 1912. At the close of the War he entered politics under the democratic standard. In 1920 he became minister of education and religion in the Prussian state government, and in 1921 he was appointed to the same office in the German federal cabinet. His writings are concerned largely with the philosophy of Protestantism. They include: *Soziallehren der Christlichen Kirchen und Gruppen* (1912); *Zu Religions Lage, Religions Philosophie und Ethik* (1913); *Augustin* (1915); *Deutsche Zukunft* (1916); *Humanismus und Naturalismus* (1916); and *Geschichte der Philosophie des Positivismus* (1919).

TROLAND, LT. See PSYCHOLOGY, EXPERIMENTAL.

TROPISMS. See ANIMAL PSYCHOLOGY; ZOÖLOGY.

TROTSKY, LEON (LEON BRAUNSTEIN) (1877–). A Russian Communist leader, born near Elisavetgrad, South Russia, and educated at the University of Odessa. He became a member of the left wing of the Social-Democratic party and in 1898 was arrested and later deported to Ust-Kut, Siberia. He soon escaped, however. He attended the International Socialist Conference at Stuttgart, that at Copenhagen, and the Pan-Slavonic Congress at Sofia in 1910. In 1914 he criticized the Socialists for supporting their governments in the War and considered the Zimmerwald Manifesto too moderate. Neither France, Switzerland, nor Spain would harbor him, so he came to the United States in 1917 and helped publish the Russian newspaper *Novy Mir* in New York City. After the revolution of March, 1917, he went back to Russia and was elected president of the Petrograd Soviet. As he represented the extreme left wing of the Communist party, he often opposed Lenine's more moderate proposals. He signed the Peace of Brest-Litovsk and organized the Red Army, whose commander-in-chief he became. He made, as he said, "an armed alliance of the workman and peasant, where there is no room either for the middle-class property holder or the rich peasant. The state tolerates them economically but does not give them political rights, much less weapons."

TROWBRIDGE, AUGUSTUS (1870–). An American physicist, born in New York City, and educated at Columbia University and in Berlin. During 1898–1900 he was instructor in physics at the University of Michigan and in 1900–06 a member of the faculty at the University of Wisconsin. In 1906 he became professor of physics at Princeton University. During the War he served in the intelligence department at Pershing's headquarters in France and was honorably discharged in 1919 with the rank of lieutenant-colonel. He received the Distinguished Service Medal and the Distinguished Service Order, as well as the decoration of the Legion of Honor. He was chairman of the division of physical sciences and member of the fellowship board of the National Research Council (1920–21).

TRUCIAL OMAN. See ARABIA.

TRUSTS. The year 1914 was important for students of trust legislation. During this year two noteworthy acts were passed by Congress, the Federal Trade Commission Act and the Clayton Act. The Bureau of Corporations which went into operation in 1904 had been rendering very distinct aid in the curbing of certain evils in the trusts. The creation of the Federal Trade Commission was a direct outcome of the Bureau of Corporations. The chief provisions of the Trade Commission Act follow. (1) A Federal Trade Commission of five members appointed for seven years at an annual salary of $10,000 each was created. (2) The act specifically condemned as unlawful unfair competition by industrial combinations. (3) The principal duty of the Trade Commission was to take action against unfair practices when it was convinced that such existed. The Commission was to serve a complaint and hold a hearing and was authorized to order the discontinuance of any practices found to be unfair. In case the order of the Commission was not obeyed, it had the power to lay the case before the Circuit Court of Appeals. The court might issue an injunction. The decision of the Commission was greatly strengthened by the fact that its findings, if supported by adequate testimony, were regarded as conclusive. (4) The power of the Commission was extended to include the investigation of corporations engaged

in interstate commerce, with the exception of banks and common carriers. (5) The Commission was authorized to demand from corporations annual reports and other information relative to the conduct of their business. (6) It might initiate investigations relative to the manner in which previous decrees had been carried out by industrial combinations The Commission might publish its findings if it seemed in the public interest (7) On direction of the President or of either house of Congress, or on application of the Attorney General, the commission was required to investigate any alleged violations of the antitrust acts and to recommend such changes as should bring the practices into conformity with the requirements of the act. (8) If the Federal Court made the formal request, the Federal Trade Commission might act in an advisory capacity, relative to the form which the decrees of the court should take. The purpose of the Federal Trade Commission Act was to prevent unfair practices of industrial combinations rather than to inflict punishment when such practices occurred. The power of the Federal Trade Commission was made, under the provisions of the act, much more definite and real than that of any previous governmental body created for the purpose of regulating industrial combinations.

The Clayton Act contained, first, a series of prohibitions against local price discriminations, holding companies, tying contracts, and interlocking directorates; secondly, a statement of the remedies to be applied; and thirdly, a defining of the position which labor was to occupy under it. Price discrimination, where the effect might be to lessen competition or to create a monopoly, was declared unlawful. This provision was not intended to interfere with bona fide transactions and the selection of customers. Any exclusive selling or leasing contracts whose effect was to limit competition was declared unlawful: "The acquisition of stock in one corporation by another, or the combination of two or more corporations through stock ownership, where the effect 'may be specifically to lessen competition, . . . to restrain . . . commerce, . . . or to tend to create monopoly' is prohibited." Interlocking directorates were prohibited, provided the object of forming such a directorate was to restrain competition by combination in a way not permitted by the act. The violation of any of the measures of the act was considered the definite responsibility of the individual directors, officers, or agents who authorized or permitted the acts constituting such violation. It was definitely declared in the act that all laws relating to combination were not to apply to combinations of labor. The courts were forbidden to issue injunctions in labor disputes unless necessary to prevent irreparable damage. Trials for contempt of court in labor cases was to be by jury, except when the contempt was committed in the presence of the court.

In foreign countries combinations are not forbidden either for domestic or foreign trade For this reason industrial enterprises in the United States are at a distinct disadvantage in competing against foreign corporations. After the Clayton Act was passed in 1914, many writers called attention to this handicap under which American exporters labored. The result was the Webb-Pomerene Act of 1918, which was sponsored by President Wilson. This law permitted the American exporters to combine for the purposes of foreign trade on the condition that they file annual reports with the Federal Trade Commission regarding the character of their enterprises. From one point of view this act might be considered a success, as a large number of combinations had already been formed in 1924. From another point of view, the United States was in an anomalous position. The Clayton Act forbade combinations for domestic manufacture and sale but permitted combinations for selling abroad

Under the existing legislation relating to trusts, the Sherman Act of 1890 and the Clayton Act and Federal Trade Commission Act of 1914, many important suits were fought in the courts. The work of the Commission had not been generally spectacular, but it had rendered real service in checking unfair practices and discouraging combinations likely to affect public welfare unfavorably. A few cases are outstanding both in importance and in public interest. Chief among these was the United States vs. the United States Steel Corporation The government brought suit against this giant combination on the ground that it was a monopoly and was engaged in unlawful restraint of trade. The decision of the District Court, rendered in October, 1911, was favorable to the corporation. The decision of the Supreme Court was not rendered until March, 1920; in effect it was that the United States Steel Corporation had not used aggressive measures against its competitors, and that the corporation did not possess full monopolistic advantages. The majority decision of the members of the Supreme Court was definite in its statement that mere size does not necessarily mean monopolistic powers. While the United States Steel Corporation was much larger than any of its competitors, it was not in a position to dominate prices of steel products, for the value of its output was not as great as the total value of all its competitors combined. The great argument was that the object of antitrust legislation was to condemn monopoly and unfair methods of competition. The corporation could not be condemned on either count. The majority opinion of the judges was that the public interest would suffer more if the corporation should be compelled to break up into smaller units. Certain practices in which the corporation had indulged for the purpose of maintaining prices were condemned. Certain pools, associations, and gentlemen's agreements had been formed with the competitors of the trust, but they had not been successful and had been abandoned nine months before suit was brought The court held that the formation of such price agreements was proof that monopolistic advantage did not exist. Four judges were in favor of the decision outlined above, and three dissented. Two judges did not vote; one had previously been associated with a proceeding against the corporation, and the other had publicly expressed the opinion that the corporation was using unlawful methods. Had all the members of the Supreme Court participated, the decision would probably have been different The public may expect a wide variation in opinion in the application of the so-called "rule of reason" to different suits brought by the government against industrial combinations.

Another important action of the late years of the decade against industrial combination

was that of the meat packers of Chicago. In 1910 suits were brought against the National Packing Company, an organization holding certain independent properties which had been acquired by the Swift, Morris and Armour companies. The board of directors of this company was made up of representatives of the three large packing firms. In 1912, while under fire, the National Packing Company was dissolved by the members themselves, and its assets were distributed among the three companies involved. The extent to which this dissolution actually restored competitive conditions was not generally known. In December, 1919, a decree was issued which materially affected the packers, known as the "Big Five" (the Armour, Swift, Morris, Wilson, and Cudahy companies). Under threat of a suit for dissolution, the "Big Five" agreed to a decree enjoining certain practices which were considered opposed to the public interest. The decree of the court was entered on Feb. 27, 1920. It provided that the "Big Five" were forbidden perpetually to form any contract or combination in restraint of interstate commerce. The companies concerned were forbidden to own stock in any stockyard market in the United States or in any stockyard terminal railroad in the United States. The defendants were enjoined from carrying on either directly or indirectly the manufacture, jobbing, selling, or distributing of a large number of commodities, including vegetables, confectionery, fish, soft drinks, preserves, coffee, tea, chocolate, flour, and sugar The exception permitted was when these commodities were utilized by the defendants in carrying on their business as packers. From this part of the decree it is obvious that the "Big Five" were entering other lines of endeavor and had acquired considerable influence on the prices of foodstuffs in different localities. The packers were also enjoined from owning or operating in the United States any markets except those located at their plants. They were also forbidden to own stock in public cold-storage warehouses and to engage in the business of buying and selling fresh milk and cream.

From these and other sections of the decision it is obvious that the court objected to the influence which the "Big Five" might exert on the prices of the foods of the nation. The packers were limited by decree to the ownership and operation of the meat industry. In so far as the commodities over which they had attempted to gain control were meat substitutes, it is clear why this decision of the court was made. The judgment of the court in this case is interesting because of the peculiar character of the limitations placed on the combination. The opinion of many students of the trust problem was that the packing industry was more democratic and less monopolistic than formerly. The packers themselves made efforts to convince the public that such was the case. See LABOR LEGISLATION.

TSAO KUN (1865–). A president of China, born at Tientsin of humble parentage. His career began when as a boy he entered the provisional army, where his ability was soon recognized. He attended the Pelyang Military Academy and saw service in the Chino-Japanese war in 1894; after graduating he was appointed director of the Soldiers' Training School at Shiao Chan. He was at Mukden almost two years and in 1911 assisted in the revolution which overthrew the Manchu dynasty and established the republic. His political power grew rapidly. In 1917, when Li Yuan-hung was president, General Chang Hsun effected his *coup d'état* which put the young Emperor on the throne, but Tsao Kun and his army forced him out. In 1918 he fought against Dr. Sun Yat-sen's South China army. Later he gained control at Peking and was elected president on Oct. 5, 1923. On October 16, he dismissed lax officials who had permitted brigandage, and on Jan. 13, 1924, he accepted the resignation of the entire cabinet. See CHINA, *History*.

TSINGTAU. See SHANTUNG.

TUAMOTU ISLANDS. See PACIFIC OCEAN ISLANDS.

TUBERCULOSIS. During the decade 1914–24, medical views about this affection underwent numerous and notable modifications. It is known that the mortality has notably lessened, except in some European countries subjected to hardships and underfeeding. The explanation of this improvement has not been so clearly ascertained. Crusades against the disease in the past were based on very imperfect knowledge, such as the assumption of the danger of man-to-man contact in spreading the disease and of the deadly quality of the expectoration. In 1924 the best opinion was that nearly all individuals entertain the bacillus in their tissues when young and that the harboring of this germ, so far from being a menace to later years, induces a process of immunization, in the absence of which a vast number of individuals might develop the disease in active form in adolescence and maturity. It is this immunization which may protect the individual in later life from contact with the bacillus as spread by open cases of tuberculosis. In other words, a strain of mankind without this immunity might develop the disease in a true pestilential form such as has often appeared among aboriginal races.

We are still quite unable to understand why well-nourished and intelligent men and women develop the disease in the absence perhaps of any obvious factor of causation. The only help in accounting for these cases may be supplied by a theory of Ferran, the Spanish bacteriologist, who believes that the bacillus goes through a series of mutations, only one of which is dangerous to the organism. Should this phase be reached, apparently the ordinary safeguards of good health, abundant nourishment, etc., are insufficient for defense. Trudeau and other phthisiologists state that of a certain number of incipient cases, some are already beyond hope because they simply will not respond to curative measures. It seems doubtful whether this large fraction can ever be salvaged without the discovery of a true specific.

TUBERCULOSIS, BOVINE. See VETERINARY MEDICINE.

TUBES. See RAPID TRANSIT.

TUBUAI ISLANDS. See PACIFIC OCEAN ISLANDS.

TUFFIER, THÉODORE (1857–). A distinguished French surgeon, a pioneer in the surgery of the thorax, including the lungs, orifices of the heart, arch of the aorta, etc. He was born in Bellême in Orne and was educated in medicine at the University of Paris. Some of his writings are of small compass, the more pretentious comprising *Du Rôle de la Congestion dans les Maladies des Voies Urinaires*

(1885); *Etudes Expérimentales sur la Chirurgie du Rein* (1889); *Chirurgie du Poumon* (1897); *Petit Chirurgie*, with Desfosses, 5th ed. (1919); *Traité Médico-Chirurgicale des Maladies de l'Estomac*, with Matthieu and Sencert (1913).

TUFTS COLLEGE. A coeducational institution at Medford, Mass., founded in 1855. Its School of Medicine and Dentistry is at 416 Huntington Avenue, Boston, Mass. The student enrollment of the college was 1223 in 1914, as compared with 2087 in the year 1923–24. The faculty also was increased, from 242 in the earlier year to 329 in the later; the library from 72,000 to 85,000 volumes, and the productive funds from approximately $2,000,000 to $2,834,588. In 1923–24 a chemistry laboratory was being built at a cost of $275,000. John A. Cousens, LL.D., succeeded H. C. Bumpus, Ph.D., as president in 1919.

TULANE UNIVERSITY OF LOUISIANA. An institution for higher learning, founded at New Orleans, La., in 1834. The student enrollment on Nov. 1, 1914, was 2510, as compared with a registration of 4047 on Nov. 1, 1923, an increase of more than 60 per cent. During that period the faculty increased from 297 to 369 members; the number of volumes in the library, from 68,700 to 93,184; the productive endowment, from $4,297,987 to $6,349,715; and the revenue fro i the productive endowment only, from $221,533 to $357,669. In 1920 President Dinwiddie inaugurated a campaign for additional endowment. Pledges amounting to $2,100,000 were received, and of this amount $1,216,000 had been collected at the close of 1923. In 1918 Newcomb College for Women removed to its new campus adjoining the other university buildings and erected three new buildings. Albert B. Dinwiddie, Ph.D., LL.D., succeeded Robert Sharp, Ph.D., LL.D., as president in 1918.

TULSA. A city of Oklahoma. Situated in the centre of a vast and newly-opened oil-producing area, the city increased phenomenally in population, from 18,182 in 1910 to 72,075 in 1920, and to 102,018 by estimate of the Bureau of the Census for 1923. Between 1919 and 1924 Tulsa County built 150 miles of paved roads radiating in every direction from the city. A water supply project which was to bring water 60 miles by gravity from a 50-foot dam in the Ozark Mountains, at a cost of $7,500,000, was under way in 1924. Building permits rose from $1,194,639 in 1910 to $7,781,252 in 1923, and bank deposits from $33,000,000 in 1916 to $62,059,000 in 1924. The International Petroleum Exposition was established in 1923. In a race riot in June, 1921, between 25 and 50 persons, white and colored, were killed, many were injured, and several blocks of the city were burned. Two years later, in 1923, Governor Walton declared martial law in Tulsa County and sent a military court of inquiry to the city to investigate the whippings and mob violence that had been rife for several months.

TUMULTY, Joseph Patrick (1879–) Secretary to President Wilson, born at Jersey City, N. Y., educated at St. Peter's College. He practiced law in New Jersey and was elected to the New Jersey Assembly in 1907. In 1910 he was appointed private secretary to Woodrow Wilson, then governor of New Jersey, and clerk of the Supreme Court of New Jersey in 1912. When Mr. Wilson became President of the United States in 1913, Mr. Tumulty was made his private secretary and served in that capacity till 1921. His close association with President Wilson made his book, *Woodrow Wilson as I Know Him* (1921), of especial interest.

TUNGSTEN FILAMENT LAMPS. See Electric Lighting.

TUNIS, or Tunisia. A French protectorate in North Africa with an estimated area of 50,000 square miles. By the 1921 census the population totaled 2,093,946, of whom 48,436 were Jews, 1,889,388 Arabs and Bedouins, 54,476 French, 84,799 Italians, 13,520 Maltese. Total European population was 156,122, a gain of 7646 over 1911. Populations of large cities were: Tunis, the capital, 170,381; Bizerta, 20,763; Ferryville, 4675. Agriculture continued to predominate and showed gratifying advances. The 1,491,518 acres under wheat yielded 289,000 tons in 1921; 1,227,704 acres under barley, 250,000 tons; 158,441 acres under oats, 60,000 tons; 58,367 acres of vineyards produced 3,733,266 gallons of wine. The mean production of dates during 1917–21 was about 38,000 metric tons. Olive trees produced about 45,000 metric tons of oil in 1922. Other products were almonds, oranges, lemons, shaddocks, pistachios, alfa grass, henna, and cork. Other important products were phosphates (2,357,000 tons in 1923) and iron (845,000 tons in 1921). Fishing and the sponge industry also continued to be important. The great increase in live stock over the period 1913–21 is noteworthy. Cattle in 1913 and 1921, 157,100 and 488,348; horses, 29,500 and 74,245; mules and asses, 107,700 and 174,351; camels, 123,900 and 132,196; sheep, 843,100 and 2,037,551; goats, 561,700 and 1,113,845. In 1921, the total area occupied by French colonists was 2,530,000 acres; by Italians, 427,000 acres; and by other Europeans, 116,200 acres. The presence of an agricultural bank and central coöperatives among farmers greatly stimulated the whole industry. The advances made were mirrored in the trade record. Exports for 1913 and 1922 were 178,663,000 francs and 444,680,000 francs; imports for the same years were 144,254,000 francs and 856,377,000 francs. Proportions by countries of origin (imports) and destination (exports) of the Tunis trade for 1922 were: France, 48 and 48 per cent; Italy, 9 and 22 per cent; United Kingdom, 12 and 5 per cent; United States, 7 and 2 per cent. The 1922 budget called for expenditures of 207,164,000 francs; in 1913, this was only 85,000,000 francs. The charges for the debt service constituted almost a fourth of the total expenditures. The debt, Jan. 1, 1922, totaled about 580,000,000 francs. In 1920 a loan of 255,000,000 francs was authorized, of which the first section of 40,000,000 francs was floated. The reigning bey, Side Mohammed, succeeded to the throne July 10, 1922. In 1922, an increased share in the government was bestowed on the natives. Five regional councils at Tunis, Bizerta, Susa, Kef, and Sfax were erected as well as a grand council for the whole protectorate. The latter, made up of two sections, one French and the other native, was given the power to examine the governmental budget.

TUNNELS. In the United States considerable tunnel construction was undertaken in the period from 1914 to 1924 in connection with various important power and irrigation projects, as well as in connection with railways and urban rapid transit and acqueducts. (See Rapid

TRANSIT; AQUEDUCTS). The hydraulic tunnels naturally varied considerably in importance, ranging from such pressure tunnels as that at Niagara Falls to those in connection with power and irrigation development, in the western United States. The Niagara Falls rock tunnel, which was 32 feet in diameter inside the concrete lining and 36 feet inside the rock break line, was constructed with a length of 4300 feet on the American side around the Falls, to parallel the hydraulic canal and to supply water to the Niagara Falls Power Company. It was a siphon tunnel dipping down from the level of the upper river to a maximum depth of 130 feet and rising to practically upper river level again from the forebay of the upper plant, which was an extension of Hydraulic Plant No. 3 of the Niagara Falls Power Company. The tunnel was designed for a flow of 10,000 feet per second, to afford power for a new plant containing three 70,000 horse-power reaction turbines. The new tunnel had a semicircular arch and a trapezoidal base section with rounded corners and was concrete lined.

An important tunnel in the West was that for the Kern River plant which was originally constructed with a section of 6 feet 6 inches. This measurement was enlarged to 13 feet 6 inches by a 14-foot section.

Liberty Tunnel, Pittsburgh. Up to the inception of the Hudson River vehicular tunnel, the largest highway tunnel built was the Liberty Tunnel, through the South Hills at Pittsburgh, Pa. This tunnel provided two separate roadways each for two lines of traffic, with space for street cars, and was excavated in shale; each tube was of horseshoe form with semicircular roof arch of 13 feet 3¼ inches radius and with side walls 7 feet 2 inches high within the crown of the roadway. The length from portal to portal was 5715 feet, and the tunnel was designed for an estimated capacity of 1690 vehicles per hour in each direction at the maximum, or two lines of vehicles both traveling at 15 miles per hour, the vehicles 100 feet apart in each line.

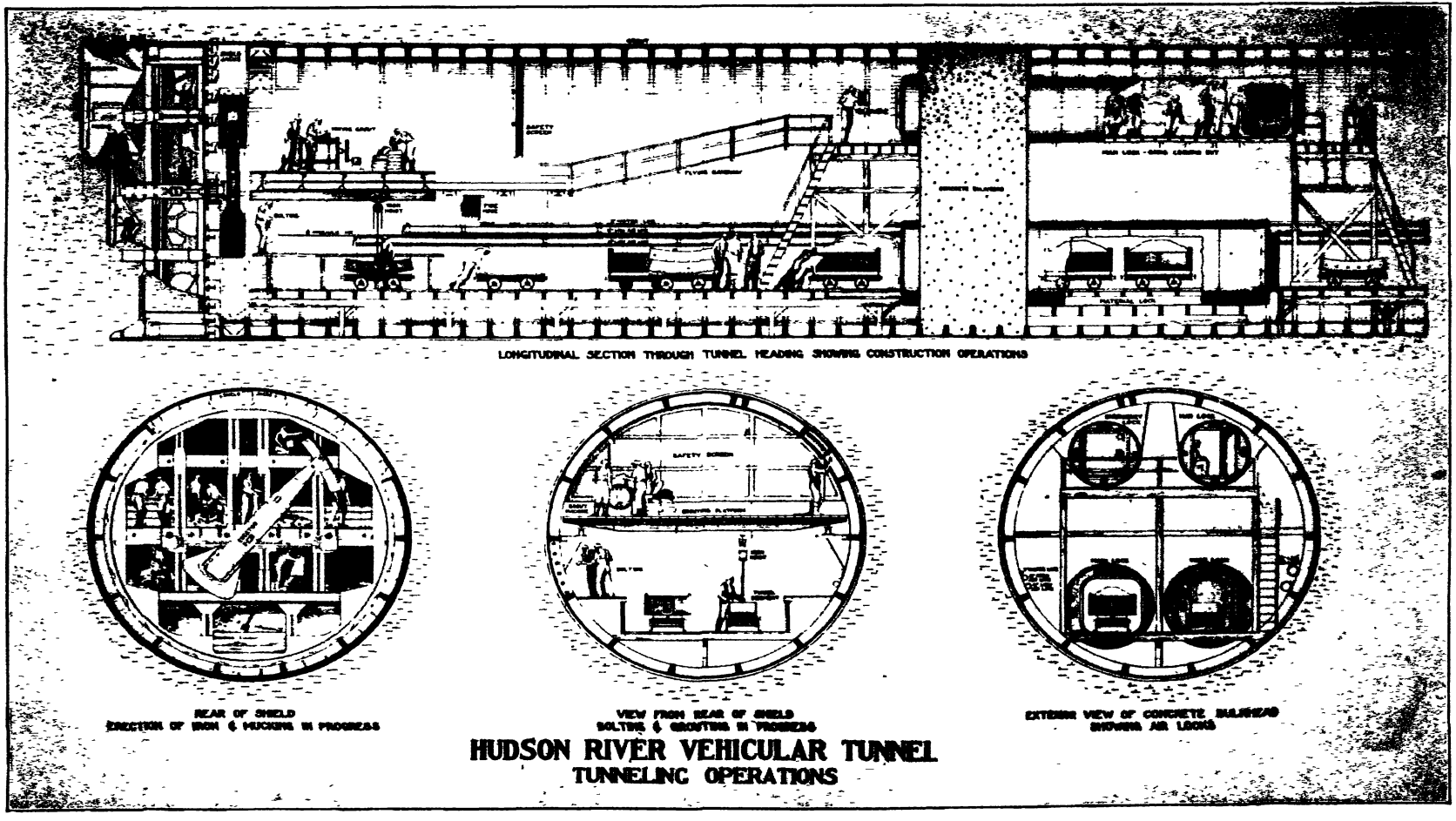
When construction of long vehicular tunnels to accommodate considerable motor traffic was first proposed, opinion was not unanimous as to whether such traffic was essentially different from ordinary street traffic in its difficulties or dangers. One group argued that the danger of carbon monoxide poisoning was very serious in view of the confined space of the tunnel. Here at Pittsburgh the region served was purely residential, so that in addition to street cars the traffic consisted largely of passenger motor vehicles, and the problem was to provide for the ventilation, particularly as the motor cars would emit carbon monoxide gas, with the possibility of disastrous effects on persons passing through, from the high concentration of such exhaust gases. After considering this question very carefully, elaborate ventilating machinery was installed at the Liberty Tunnel, but the tunnels themselves were first operated with restricted traffic, with a constant check of the air conditions to determine the carbon-monoxide content Not only the local authorities but representatives of the Pittsburgh Station of the Federal Bureau of Mines were actively interested in this matter and were constantly on duty in the tunnel to watch the air conditions.

In the preliminary studies based on the maximum traffic of 114 automobiles in either tube of the tunnel at any one time, it was assumed that the total carbon-monoxide emission, taken at 1.5 cubic feet per vehicle per minute, would be 170 cubic feet per minute for each tube of the tunnel. It was concluded from experimental data that the carbon-monoxide content of 6 parts in 10,000 at the exit, or one-half that quantity, would be an allowable average; so it was planned to supply 280,000 cubic feet of fresh air per minute to each tube. The tunnel itself formed a ventilation duct drawing in air at one end through suitable lateral nozzles in the side walls located near the entrance and facing toward the other end of the tunnel. The ventilating currents, consequently, would move with the traffic, but there was provided for each tunnel an air-pumping plant which would afford an emergency maximum pumpage of 280,000 cubic feet of air per minute per tube, or a normal maximum of 20,000 cubic feet of air per minute. Normal pumpage discharge velocity at each nozzle would be 2940 cubic feet per minute or about 33 miles per hour, and with a maximum pumpage the discharge velocity would be 4210 feet per minute or about 47 miles per hour.

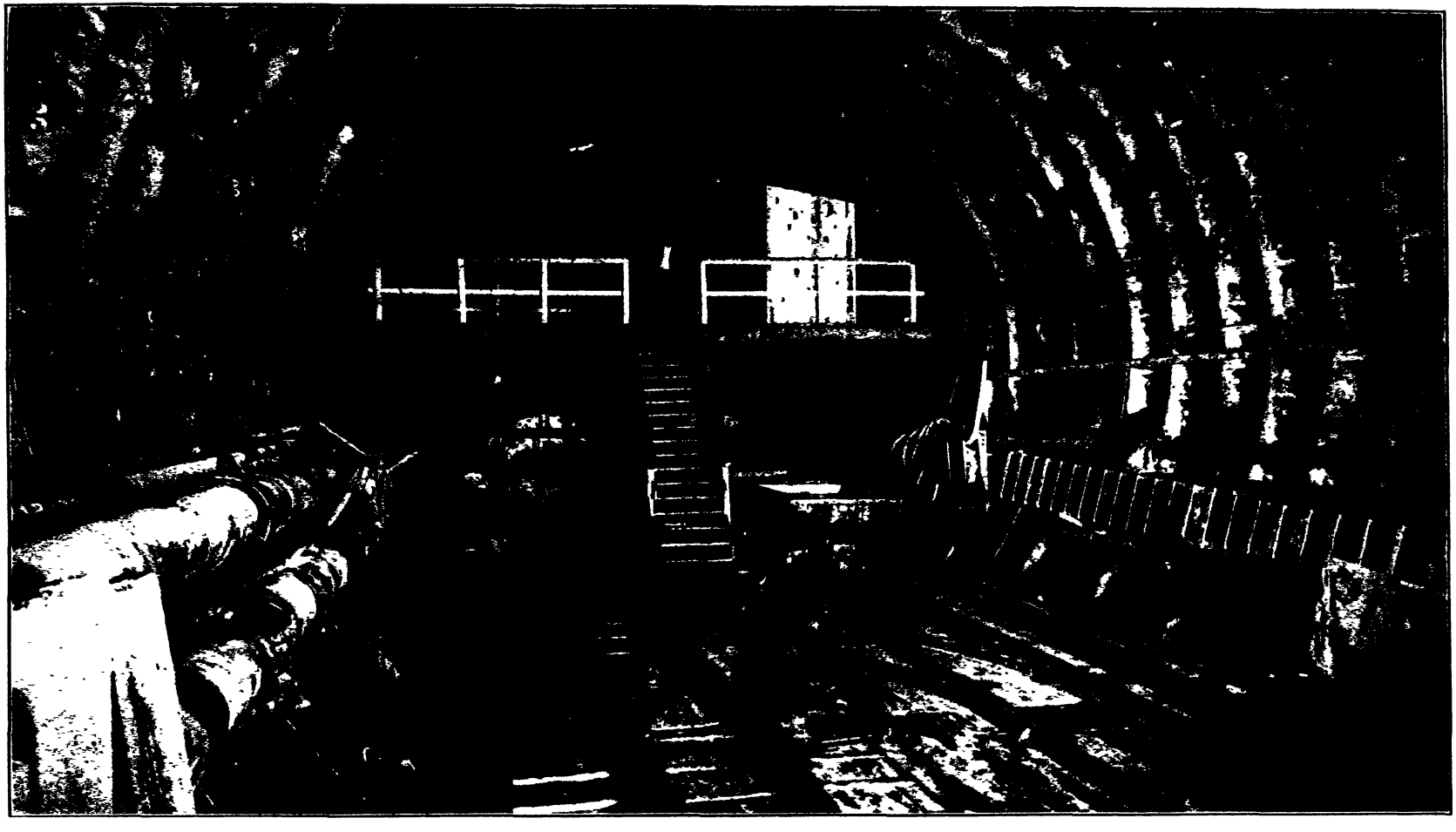
While the system of ventilation design was based on work done by Saccardo in ventilating tunnels in Italy and had been used on some American railway tunnels, nevertheless a considerable amount of experimental work was carried on and conditions were formulated for safe operation. Accordingly the Liberty Tunnel in Pittsburgh, with its twin passages, was the subject of considerable discussion, and although ventilating apparatus was provided in its design, yet for six months it was operated without artificial ventilation, and during this time the natural ventilation seemed to dispose of the gas satisfactorily for moderate traffic. When there was congestion of traffic, owing to a chance interruption or to an unusual movement of vehicles, the heavy production of gas was likely to develop a serious situation; accordingly it was realized that artificial ventilation was essential and that at the same time there must be adequate policing and supervision to control operation.

Ordinarily a normal monoxide content of 4 parts in 10,000 was considered permissible, and when this amount was exceeded, traffic was reduced. It was found that the variation of the carbon monoxide depended not only on the amount of traffic but also on the air currents due to the direction of the wind and the movement of the vehicles. Up to May, 1924, there had been no serious trouble in the tunnel. Then a gas poisoning accident in which a pedestrian who had gone into the tunnel to seek refuge from the rain was overcome was attributed largely to the unfavorable wind. In the following week, on May 10, congestion resulting from abnormal traffic due to the street railway strike was such that a number of persons were seriously affected by the high concentration of automobile exhaust gases. The police and fire departments and the Bureau of Mines local corps were called on to remove a number of persons overcome in the tunnel. While no serious aftereffects were reported, it was realized that the safe operation of the tunnels could be secured only by considerable vigilance.

Hudson River Vehicular Tunnel. In addition to the notable tunnels for rapid transit or subway service around New York City, which



CONSTRUCTING A SUBAQUEOUS TUNNEL BY THE SHIELD PROCESS



HUDSON RIVER VEHICULAR TUNNEL

Interior of tunnel lining showing bulkhead with the manlocks above and the mucklocks below

for the most part involved cut and cover methods, active work was started in 1922 on a twin-tube vehicular tunnel under the Hudson River between New York and Jersey City. This project involved twin tubes of cast iron with a mean length of 6881 feet, with subway and open cut approaches. The distance between grade points was 9300 feet. As originally planned, the outside shell diameter of both tubes was 29 feet, and the estimated cost was $28,669,000; but further consideration and special investigation of ventilation, based on Pittsburgh experience and other studies, demonstrated the necessity for larger ducts both of fresh and of exhaust air than the original diameter permitted, so that the diameters of the under-river tubes were therefore increased to 29 feet 6 inches, and the diameter of the north tube in New Jersey was increased to 30 feet 4 inches, adding $750,000 to the original estimated cost.

For the construction of these tunnels, twin shafts were sunk on the shore, although on the New York side one river shaft served both tubes. From these shafts five shields were in operation, two working west from New York and two east from New Jersey, and one working west from the north tunnel shore shaft in New Jersey After the south tunnel inland had been completed, the shields driving the river tubes were to meet under the river. As the work of developing and executing this project went on, it was found necessary to increase its general scope considerably. Not only were widened approach roadways decided on, but more elaborate designs for the approach section were made, and a tiled lining was contemplated along with considerable architectural treatment.

The ventilating system provided for the admission of fresh air from a duct in each tube beneath the roadway, which was 20 feet in width, while above the roadway an exhaust air duct was provided. With the experience and skill acquired in many tunneling operations about New York City, no extraordinary difficulties were encountered, as the under-river work involved boring through silt or soft mud The various extensions and improvements brought the estimated cost up to some $42,000,000, a considerable increase over the original estimates.

Moffat Tunnel. One of the most notable tunnel projects put under way between 1914 and 1924 was the 6-mile Moffat Tunnel through the Continental Divide about 50 miles west of Denver, Colo. Work was begun on it in 1923. In the previous year the Legislature of Colorado authorized a commission which might issue bonds for the prosecution of the work, and on Sept 18, 1923, the Moffat Tunnel Commission entered into a contract to construct the tunnel for $5,250,000, the contractors agreeing to do the work for a fixed fee of $140,000. The tunnel passes under James Peak and was to be a part of the line of the Denver and Salt Lake Railroad, replacing the grade over Summit Pass. According to the plans, the Moffat Tunnel was to be 32,150 feet in length, or almost exactly 6 miles. The east portal is 3 miles beyond Tolland, on the Denver and Salt Lake Railroad, and the west portal 1 mile from Irving; these two stations are about 50 and 80 miles respectively from Denver. A grade of 0.3 per cent ascends from the east portal at El. 9198 to the summit at mid-length and at El. 9242; thence on, a grade of 0.9 per cent descends to the west portal at El. 9085. Maximum grades of 2 per cent are provided on the approaches, which are short and consist largely of fills.

Shandaken Tunnel. The Shandaken Tunnel of the Catskill water supply for New York City (see AQUEDUCTS) was completed early in 1924 and put into service. This tunnel, the longest built up to 1923, extended through rock a distance of 18 13 miles, exceeding the length of the Simplon Tunnel through the Alps by 5.8 miles. Work was started on it in the fall of 1917 under plans and specifications prepared by the Board of Water Supply of the City of New York. The tunnel is concrete-lined and has a finished horseshoe-shaped section 10 feet 3 inches wide and 11 feet 6 inches high. Its slope is 4 feet 5 inches per mile, and its carrying capacity, 600,000,000 gallons in 24 hours. For its construction seven shafts were sunk ranging in depth from 320 to 630 feet and spaced at intervals of 2 miles. From these shafts, however, only 12 headings were worked simultaneously.

Rove Tunnel. The world's largest tunnel was put through in 1916 as an important element of the Marseilles-Rhone Canal (see CANALS), an artificial waterway 51 feet in length which extends from the Rhone River at Arles to the Bay of Marseilles. A typical section of this canal is 82 feet wide and 10 feet deep, and the tunnel was constructed so as to pierce the mountain ridge north of the city of Marseilles and to give direct access to the harbor. The tunnel is 4½ miles in length and is built with an approximately semicircular arch of 41-foot radius, affording an excavated section 79 feet wide and 50 feet high, with the canal proper forming a square invert 59 feet wide and 15 feet deep. Thus there is a clear area of 3250 square feet or a section about six times as great as an ordinary double-track railway tunnel. Although the length, 4½ miles, was not as great as that of other European and American tunnels, nevertheless the excavation in cubic yards amounted to 2,800,000 as compared with 2,100,000 for the Simplon Tunnel which had a length of 12.3 miles.

The method of construction followed was to excavate three arch headings which were opened one into the other so that a central section of rock was left to be removed. The headings were about 100 feet in cross section and were pushed forward at a rate of 15 to 18 feet a day. In driving these headings, compressed-air locomotives were used, and in the main section steam locomotives with artificial ventilation. The tunnel was masonry-lined, backed on concrete made of a specially-lined cement; and work was carried on from both ends, mostly through hard rock, so that little if any timbering was needed The canal and tunnel were comprehensively described in *Le Génie Civil* (May 20, 1916)

Otira Tunnel. In 1922 there was completed for the New Zealand Government Railways, on the line connecting the ports of Christchurch and Greatmouth on the east and west coasts of the South Island, a tunnel under Arthur's Pass, known as the Otira Tunnel, 5¼ miles in length. At this pass the summit elevation was 3050 feet and that of the tunnel 2435 feet; previous to the construction of the tunnel, the transfer of passengers and freight had to be made by stages and wagons. The tunnel was for a single-track line of 3½-foot gauge and was built on a tunnel grade of 3 per cent. In section it was 16 feet 9 inches above subgrade and 13 feet

wide at subgrade, with sides flaring outward to a width of 14 feet 6 inches at the spring of the semicircular roof, and it was excavated through solid rock; the arch was lined with precast blocks of concrete.

Tana Tunnel, Japan. For the Tokkadia line of the Imperial Government Railway of Japan there was begun in 1918 an important double-track tunnel as a part of the 30-mile cut-off in mountainous country. This tunnel, 15 miles in length, was of horseshoe section with a width of 28 feet and a height of 22½ feet above subgrade, and accommodated two tracks of 2½ feet grade. Here also brick or concrete blocks were used for the arch, while brick or monolithic concrete was used for the side walls.

Second Simplon Tunnel. The War in Europe and the restriction of European government activities naturally interfered with tunnel projects which might have been possible under normal conditions. In 1921, however, the second Simplon Tunnel was completed, with a total length, from portal to portal, of 19,825 meters (12.36 miles). This second tunnel was not altogether a new construction, as it involved the enlargement of the pioneer or ventilation heading which was driven parallel to the first tunnel when the latter was constructed.

English Channel Tunnel. The War did not put an end to discussion of the proposed crossing of the English Channel by means of a submarine tunnel under the Straits of Dover. Because of the continued refusal of the British government to grant the necessary authority nothing positive was accomplished. The distance was 27 miles, and in view of the great developments in tunnel construction, many believed the project was entirely feasible. In 1923 Sir Percy Tempest, the chief engineer of the tunnel company organized for this work, and also general manager for the Southern Railway, whose lines would connect with the tunnel, issued a statement in which he said that the material to be encountered for the entire distance excavated was very favorable; the deep bed was of chalk marl or chalk infiltrated with clay. He believed that with the special boring machine designed for this work, a heading 12 feet in diameter could be driven at the rate of 120 feet per day, and that two machines started at the opposite ends should meet in less than three years. The plan proposed was first to finish this pilot tunnel or heading and then to enlarge it to full section so that the concrete-lined tunnel would be finished by the estimated time of four and a half years. The estimated cost of this undertaking was $145,000,000. With the existing traffic the annual revenue would pay more than 5 per cent of the costs. It was obvious, however, that political and military considerations other than the engineering possibilities were the governing reasons for the failure of the British government to authorize the undertaking. On July 7, 1924, Premier Macdonald announced in the House of Commons that the government had decided against the Channel Tunnel. It was believed that the scheme would be quiescent for a time. See RAPID TRANSIT.

Bibliography. Recent works in this field include: Brunton, David W., and Davis, John A., *Modern Tunneling*, revised edition (New York, 1922). This edition includes new chapters on railroad tunneling by J. Vipond Davies; considerable attention is devoted in them to American practice in tunnel construction. See also Hewett, B. H. M., and Johannesson, S., *Shield and Compressed-Air Tunneling* (New York and London, 1922), as well as the engineering journals.

TURBINE, STEAM. See STEAM ENGINES AND TURBINES.

TURKESTAN, CHINESE. See SIN-KIANG.

TURKESTAN, RUSSIAN. Since the Russian Revolution, an autonomous republic in Central Asia federated with the Union of Socialist Soviet Republics. It was governed after Apr. 12, 1921, when Moscow relinquished control, by its own Central Executive Committee and Council of People's Commissaries. It comprised the provinces of Ferghana, Samarkand, Semiryetchensk, Syr-Darya, and Transcaspia and has an area of 571,650 square miles and a population of 7,201,551 (1920.) The population in 1912 was 6,416,700. The leading cities with their estimated populations are: Tashkent 200,000; Khokand, 110,000; Namangan, 100,000; Samarkand, 90,000. The people were largely Mussulmans of Turko-Mongol origin belonging to the Kirghiz, Uzbeg, Sart, and Turkoman groups. This racial diversity militated against all attempts on the part of the Turks to win over the population to Pan-Turanianism. There were sporadic movements of this kind both during the War and after, notably in 1922, when Enver Pasha appeared in the country for a short time, only, however, to be driven back into the hills of Bokhara. For the same reason what little government authority existed was taken over by the Russian Communists, who represented an infinitesimal part of the population. All the Russians in the region did not comprise more than 6 per cent of the inhabitants. Cotton culture continued to thrive to such an extent that wheat growing was largely abandoned. Before the Revolution there was an increased activity manifested in the cultivation of the vine and in orcharding, while factories were being erected for the exploitation of cotton products. The events of 1917 broke communication with European Russia and put an end to the sources of oil from Baku upon which the factories depended for fuel, with the result that the new industrial life immediately languished. Starvation and disease left their marks on the population, the ravages of malaria in 1923 being particularly heavy. See RUSSIA.

TURKEY. A country on the Mediterranean, in 1924 almost completely confined to Asia Minor. In 1914, Turkey possessed a total area, excluding Arabia, of about 700,000 square miles. Its population at that time was about 21,274,000. By the Treaty of Lausanne of July 24, 1923, the Turkish boundaries were delimited so as to include only about half of its area of 1914, and less than half of its former population. Turkey's territory was thus made up of Anatolia, the Constantinople district, Thrace east of the Maritza River (in Europe), Kars, Ardahan, and some few islands, especially Imbros and Tenebos. The population, too, was seriously reduced. The Greeks and Armenians were expelled, the loss of men on the battlefields ran into hundreds of thousands, and disease probably had an even heavier toll among men of military age. It is estimated that the population of Anatolia was reduced by about three million. The great majority of the inhabitants in 1924 were Turks; there were some Kurds, Laz, Yuruks, Turcomans, Jews, and Gypsies. The established state religion was Mohammedanism, and until March,

1924, the caliph was the supreme head. However, late in the evening of Mar. 3, 1924, the Mayor and Chief of Police called on Caliph Abdul Medjid and his son and notified them that they and their families were to be expelled across the frontier at dawn. There were still a few followers of the Russian church as well as Jews and a few Protestants. Owing to the disturbed conditions throughout Turkey, a number of business men left. Some Germans were reported to have reached Turkey during the latter part of 1922 and the first part of 1923; most of these sought either employment or concessions. Recent statistics gave the following principal cities with their inhabitants· Constantinople, about 900,000, Smyrna, 99,000; Konia, 71,000; Brousa, 65,000; Adana, 64,000; Adrianople, 56,000; Kaisariya (Cæsarea) 50,000; Aintab, 48,000; Ourfa, 43,000; Angora, 35,000; Sivas, 31,000; Mardine, 31,000; Magnesia, 28,000; and Trebizond, 27,000. Other important cities of more than 20,000 are Kiliss, Diar-Bekir, Maraash, Eski-Shehir, Tarsus, Erzerum, Samsoun, and Adalia

Agriculture. As Turkey was primarily an agricultural and pastoral commonwealth, land was the cardinal factor of its economics. How to revise land tenure, inheritance, and mortgage laws so as to insure clear titles and develop private initiative was a paramount problem. Real property in Turkey fell within the following categories. Mulk, Vakuf, Mirie, Metruke, and Mewat. The last two did not enter into the question, as they comprised lands devoted to public roads, prayer grounds, or pastures and uncultivated waste lands. Mirie lands were State-owned but capable of use and disposal by private individuals within multifarious restrictions Vakuf lands, the usufruct of which reverted to pious foundations, such as mosques, schools, libraries, and fountains, were administered by the government; they were in reality only leaseholds, but might be held and operated by natives and foreigners alike. The only freeholds in Turkey were mulk lands, and these were not extensive aside from the "tchifliks" or feudal estates (originally mirie lands). An important portion of the real estate of the country, especially in or near cities and towns, except for the direct income from it, was practically useless as a basis of credit, since it could not in effect be mortgaged. The cultivated area was estimated at about 11 per cent of the total. It was estimated that the number of peasant farms amounted to about 900,000, and the individual farms averaged between 2½ to 12½ acres, but as the landlord and tenant system was commonly practiced in Kurdistan, Anatolia, and Thrace, these conclusions were largely speculative. More than one-third of the cultivated area was devoted to wheat; other cereals, particularly barley, corn, rye, oats, millet, rice, raised the total cereal area to about four-fifths of the total land under cultivation. Besides cereals and a large variety of vegetables, Turkey produced cotton, tobacco, several kinds of valuable seeds (including linseed, sesame, poppy, and canary seed), olive oil, opium, nuts, fruits (especially figs and raisins), silk, wine, gum tragacanth, rose oil, licorice root, and valonea. Crops during 1923 were far below normal Exact statistics were unavailable. Cereal production was far below the prewar level. The production of opium in 1923 was estimated at only about 3000 cases as against a normal crop of 5000; tobacco, 23,000 metric tons as against 33,000; figs, 20,000 metric tons as against 40,000; raisins, 30,000 metric tons, as against 40,000; mohair, 30,000 bales as against 100,000; cotton, 60,000 bales as against 120,000; silk, 100 metric tons as against 8000. While there was no dairy industry or any stock breeding, Turkey's sheep and goats were a source of considerable revenue for their fleeces (wool and mohair), skins and casings. Although the War drew heavily on stocks of horses, mules, water buffaloes, camels, donkeys, sheep, and goats, it was estimated that from 40 to 60 per cent of the flocks and herds still existed. However, in 1913 the number of sheep and goats is stated to have been 35,185,000, and cattle and buffaloes 6,132,000. The census of 1923 indicated only 14,200,000 sheep and goats, and 3,800,000 cattle. These figures cover approximately the same area In the Konieh plain, where about 150,000 acres were brought under cultivation in 1915 through a German irrigation scheme, the yield of wheat and oats multiplied from three to fifteenfold. It is possible also to reclaim by irrigation, drainage, or dry farming vast areas lying fallow in 1924. The conditions of tenants during the period were deplorable, but with an increase in production it was expected that this condition would be much improved. The woods from Turkey's forests equal any in the world for hardness, strength, and durability. As the principal forests (about 88 per cent) were the property of the government, they constituted a national asset of capital importance, covering an estimated area of about 20,000,000 acres. Although these forests prevailed over the entire Black Sea slope of Asia Minor, heaviest in Kastamuni, there were also extensive timber lands about Sivas, Brousa, and Adalia, and in the Taurus Mountains. About 745,000 trees were cut annually from the forests in Kastumuni. The principal forests consisted of pine and oak. The best woods were oak, pine, birch, chestnut, and walnut. Water power was plentiful in Turkey, but almost entirely unused.

Mining. While no comprehensive geological survey was undertaken in Turkey, it was generally believed that the country possessed vast mineral wealth Some of it, such as coal, chrome, emery, lead, copper, boracite, meerschaum, salt, marble, mercury, antimony, and gypsum, was already being extracted, with a promise of material development. Coal was mined after 1900 in the western section of Kastamuni near Heraclea and Zunguldak. The coal production in this region from 1904 to 1907 averaged about 633,000 long tons a year; from 1908 to 1912 about 830,000; from 1913 to 1918 only about 360,000—probably owing to the War—and in 1920 about 500,000 tons. In 1922, the production was about 450,000 tons, and in 1923 about 600,000 tons. The normal annual output in metric tons of the Turkish mines in operation in 1924 was as follows: Antimony ore, 1500 metric tons; asphalt, 7000; boracite, 16,000; chrome ore, 15,000; copper, 1500; emery ore, 15,000; iron pyrite, 20,000; lead, 13,000; lignite, 30,000; manganese ore, 12,000; meerschaum, 250; zinc ore, 2000, gold, 45 kilos; silver, 250; and mercury, 4500 flasks.

Manufacturing. Industries in Turkey were mostly quite primitive. In 1924 it was evident that factories were being started on a small scale, but the supply of labor seemed likely to make the work difficult, in so far as the real laborers of Turkey, viz., the Greeks and Ar-

menians, had been expelled. The chief industry was the cotton manufacturing industry, which had a total of about 50,000 spindles. The *Bulletin de la Chambre de Commerce et d'Industrie de Constantinople* gave the total number of establishments, with the exception of Constantinople, Smyrna, Brousa, Dalikesser and Eski-Shehir, as 33,058, during 1921, with the total number of workmen as 75,216. Of this number of establishments, the textile comprised 20,057. The other establishments were leather, metal, wood, foodstuffs, pottery, and chemicals. The expulsion of the Greeks and Armenians practically denuded the carpet and rug industry of Turkey and transferred this industry to Greece. At Smyrna and Adana private enterprises began to manufacture cotton cloth and cotton oil; at Constantinople, yarn, paper, and cement; at Smyrna, machinery, soap, shooks, and tannin; at Brousa, towels, garments, and leather; at Kutaia, glazed tiles and pottery; at Constantinople, Smyrna, and Mersina, ice. Statistics of these industries were unavailable. Apart from porters and boatmen in the seaports there was no professional labor class in Turkey Skilled artisans worked mostly on their own account. In silk spinneries and cotton mills, women and children were employed. Generally speaking, labor was casual.

Cost of Living. Unlike most of the countries of the Near East, the cost of living in the interior of Turkey did not increase materially. An increase was felt only in the larger cities and on the coast. The index of the cost of living at Constantinople (1914 as 100) stood at 1058 in June, 1922; 1197 in June, 1923, and 1194 in August, 923. The legal tender of Turkey is the gold pound, the par value of which is $4.40. The Turkish paper pound averaged only about $1.50 in 1919; 70 cents in 1920; 65 cents in 1921; 62 cents in 1922; 61 cents in 1923; and 52 cents in February, 1924.

Commerce. Owing to the fact that during the period 1914–24 the territory of Turkey underwent marked changes, comparative figures of foreign trade would be practically meaningless. Constantinople might be called the receiving port of Turkey, and Smyrna its shipping port. However, a number of exports were shipped from Constantinople. No figures were available for the trade of the interior of Turkey, i.e. Anatolia, such statistics having never been made up, inasmuch as the lack of transportation facilities hindered the movement of this trade. In fact, the grain-producing regions were regularly unable to dispose of their products to the non-producing regions, except by caravan, which was a very slow process. Official trade statistics, as given, ended with the year 1914, since which time the only figures available are for the trade of Constantinople. Of course, a considerable amount of this trade would be reëxports from the interior. The total trade, according to Turkish official statistics for the financial year 1914 (Mar. 14, 1913, to Mar. 13, 1914) was £T62,245,803 ($273,881,533; converted at par, 1 Turkish pound = $4.40). Imports for the year totaled £T40,809,682 ($179,562,601); exports, £T21,436,121 ($94,318,932). The following statement shows the trade of Constantinople for the financial years indicated:

	Imports	Exports
1918–19	$139,143,564	$57,641,808
1919–20	118,577,387	33,338,117
1920–21	78,864,202	19,746,878

Complete figures for the trade of 1922 were unavailable. The total imports into Constantinople amounted to £T67,884,181 ($42,088,192). The total value of the trade of Constantinople for the first half of 1923 was as follows: imports, £T38,474,991 ($24,023,994); exports, £T12,941,998 ($8,282,847). Conversions were made at the average exchange rate of the Turkish pound for the first half of 1923, $0.64. The principal articles of import during 1921 were cotton, cotton goods, cereals, wool and woolens, petroleum products, Colonial products, and metals and metal manufactures. The principal articles of export from Turkey were opium, dried fruit, hides and skins, wool and mohair, oil seeds, carpets, and tobacco. The principal countries selling to Turkey during 1921 were the United Kingdom, the United States, Italy, and France. The chief purchasers from Turkey were Rumania, Greece, the Netherlands, the United Kingdom, and France. The Turkish trade balance from 1914 on was unfavorable.

Communications. New Turkey had in operation 2455 miles of normal-gauge and 329 miles of narrow-gauge railways. The Angora-Sivas line was being constructed in 1924, and various other projects were under consideration for the further construction of railway lines and branch lines. The Minister of Public Works set the total mileage of highways at 15,104, but added that only 1829 miles were in good condition. There were no navigable rivers in Turkey, but the long coast line compensated to some extent for the lack of highways and waterways. The number of post offices in Turkey was estimated at 1814. The length of telegraph lines in Turkey was about 28,890 miles, and the length of wire about 49,200 miles. There were about 1017 telegraph offices. Turkey's shipping after the War was in poor condition. It was estimated that Turkey had not more than 110,000 tons of shipping at the beginning of the War. The Turkish Chamber of Commerce estimated the strength of the Turkish merchant marine of Nov. 1, 1923, at about 83,000 tons. Six of these vessels exceeded 3000 tons, and all were under the Turkish Shipping Board which also controlled 35 vessels aggregating a tonnage of 37,000. Most of the Turkish shipping was limited in equipment. Turkey under the National Assembly limited its coastal shipping exclusively to vessels under Turkish registry, with the result that a new impetus was given to the development of a national merchant marine.

Finance. Turkey's external debt on Mar. 1, 1923, was 160,404,940 Turkish gold pounds. On Dec. 31, 1921, the total amount of treasury notes in circulation was £T153,859,936, and treasury bonds £T5,147,919. On this date prewar metal money stood at £T38,000,000 and other metal money £T20,000,000, coined by the Turkish mint during the War. Turkey's external debt increased over 1914–24, not because of any further loans, but because interest payments on existing debts were defaulted. The budgeted revenue for 1921–22 was £T22,889,661; expenditure £T21,890,867. No later official figures were available. The budget for the 1923–24 and for 1924–25 showed, as far as known, heavy deficits.

Education. In Turkey, elementary education was nominally obligatory for all children of both sexes. The provisional law of Oct. 6, 1913, stated that all children from 7 to 16 were to receive primary instruction. The state schools were under the direct control of the Minister of

Public Instruction. Besides state schools there were various madressés, or theological seminaries. The schools numbered about 36,230 and contained about 1,331,000 pupils. There were a number of foreign schools, mostly conducted by French, English, and American missionaries. The newly expressed chauvinistic attitude of the Turks tended to decrease materially the number of foreign schools.

Defense. It is stated that up to the time of the Armistice nearly 2,700,000 men had been recruited for military service in Turkey. During the War the maximum combatant strength was approximately 650,000. The strength of the Kemalist army, which drove the Greeks out of Turkey in August, 1922, was estimated to have been 190,000 men, of which 20,000 were in Eastern Thrace. The naval forces of the Angora government were insignificant.

History. The consistently friendly policy which the German Emperor had pursued toward Turkey with the beginning of the twentieth century bore fruit before the War was many months old. Russia's known designs on the Straits, England's retention of Cyprus and the spread of the English influence in Egypt, the Pan-Slavic movement which implied the irretrievable loss of Turkish territory in Europe—all militated against the maintenance of a friendly attitude toward the Allies. Late in October Turkey's hand was forced when a German-Turkish squadron, headed by the German Admiral von Souchon, bombarded Russian Black Sea ports. On October 31, Russia retaliated by declaring war The other Allies followed suit. The character of the struggle was immediately and profoundly changed. From being a war localized in Europe, its incidence spread over the Near East and touched India. The great Moslem populations under the British rule whose allegiance to the Caliph always presented the danger of a Holy War, became an ever-present reminder of the volcano upon which the British Empire was perched, with the result that attention had to be diverted increasingly to this area. So far the German diplomacy succeeded. English troops before long were engaged in Mesopotamia and in defense of the Suez Canal. Here was the origin of the ill-fated expedition to force the Dardanelles and of the prolonged struggle in the Saloniki region. War, by Turkey, was carried on with the usual ferocity. (At any rate, so it was generally believed during the War. After the War, numerous American and European students of Levantine affairs concluded that the "Turkish atrocities" and "massacres" had been much exaggerated, and were not by any means one-sided.) According to war-time reports, a policy of extirpation against Greeks and Armenians was carried out relentlessly, with the result that whole villages were wiped out, men butchered or driven into the south, and women and children carried off. The Armenians caught the greater part of the Turkish fury. Out of a population of 2,000,000, by 1916 it was estimated that 1,000,000 had been deported and 500,000 slain. (See ARMENIA.) Their nearness to the Russian frontier saved 200,000 others who sought refuge in flight. But only one insurgent spirit was stilled in this fashion. A more potent one was that of the Arabs, headed by the Grand Sherif of Mecca, who struck at the security of the whole Ottoman Empire by refusing to take up the Caliph's Holy War, and finally, in 1916, by declaring independence. (See ARABIA.) Turkish arms, except on one front, were from thence on everywhere unsuccessful. After an initial setback the British succeeded in overrunning Mesopotamia; in 1917, Palestine was lost to the Turks; and in 1918, Syria. In Transcaucasia, Turkey emerged triumphant after the collapse of Russia, and by the Brest-Litovsk Treaty received back the former Turkish provinces of Kars and Ardahan. Beset by enemies on all sides and confronted by pressing internal problems of which famine and brigandage were only the more evident, on Oct. 12, 1918, the Turkish government appealed to the United States by way of the Spanish ambassador at Washington for an immediate cessation of hostilities. On October 30 Turkey surrendered to the British Vice Admiral Calthorpe and on the next day accepted the terms of the armistice of Mudros Its conditions were drastic: the Dardanelles, Bosporus, and Black Sea were to be opened to the Allies; the army was to be demobilized, and all Turkish war and merchant ships surrendered; troops were to be withdrawn from Transcaucasia With its acceptance collapsed, too, the Young Turk movement, and Enver, Taalat, and Djemal with the other members of their party fled the country.

The subsequent history of Turkey was startling. Unlike her allies, she refused to accept the status of a conquered nation, and in the period 1919–24 so assiduously played the diplomatic game that as a result of the Greek defeat and the mutual jealousies of the French and the British, Turkey emerged to a large extent triumphant. In 1919, her rulers were prepared to accept the loss of Mesopotamia, Syria, Palestine, and Arabia as well as the restoration of the Capitulations (which Turkey had terminated on her entrance into the War), and an international control of the Straits. But the unwise decision of the Supreme Council early in 1919, at the prompting no doubt of Venizelos, to deprive Turkey of Thrace as well as Smyrna, aroused a storm that could not be stilled. Turkey was soon to be swept by the same nationalistic aspirations that held all the unrecognized races of Europe. The arrival of Greek troops in Smyrna in May, 1919, was the cause for Mustapha Kemal's journey into Asia Minor on an errand whose purpose was destined to be completely and victoriously realized four years later. Mustapha Kemal Pasha, a brilliant young army officer who had rendered distinguished service at Gallipoli and elsewhere, put himself at the head of a Nationalist movement, aiming to save Turkey from dismemberment and exploitation, to rouse Turkish patriotism on a purely national, rather than a religious basis, and to liberalize the Turkish government. So successful was his ardent appeal that within a year he had established at Angora a National Assembly obeyed throughout Anatolia. The Sultan was discredited; the Caliphate maintained its position only on sufferance. The signing of the Treaty of Sèvres on Aug. 10, 1920, by Turkish representatives who were not recognized by the Nationalists merely added strength to all those hostile forces that were preparing for a struggle The document reflected the selfish interests and warring rivalries of the powers in the Near East. By it, Turkey was to become a shadow of its former self. Thrace, the islands of Tenedos and Imbros, the Dodecanese, Smyrna (for five years preceding a plebiscite), Cyprus, Egypt, Armenia, Mesopotamia, Syria, Palestine,

the Hedjaz, were lopped off. Constantinople was to remain Turkish, but the Dardanelles, the Sea of Marmora, and the Bosporus were to form a "Zone of the Straits" under international control. An independent Armenia was established and the drawing of its frontiers entrusted to President Wilson. President Wilson finally delimited a state of 30,000 square miles with an outlet, Trebizond, on the Black Sea, but the Turkish Nationalists refused to accept the treaty, as, ironically enough, did the governments of all of the signatories. Meanwhile, with the consent of the Supreme Council, Greek forces had occupied Eastern Thrace and spread over Smyrna. Hostilities, which were to end so disastrously for the Greek ambitions, did not begin for another year. During the interim, the Nationalists availed themselves of every pause for the consolidation of their position. Attempts at conciliation by the Constantinople government were spurned. It was toward Soviet Russia that Kemal turned for aid. In an understanding effected late in 1920, Nationalist Turkey was promised financial and material aid as well as supplies of men; to facilitate a readier communication with Transcaucasia, a Turkish army marched into the Armenian Republic of Erivan in September, 1920, and by November had not only humbled it but celebrated its victories by bloodshed. The massacres recalled the days of 1915–16. The result was the establishment of a Soviet state of Armenia, the cession once again of the provinces of Kars and Ardahan to Turkey, and the establishment of communications between Erzerum and Azerbaijan.

Greece was the pivotal point of the Near East and the destiny of Turkey waited on the revelation of the Greek purpose. The startling reversal that Venizelos met in the Greek elections of 1920; the triumphant return of King Constantine as a result of the plebiscite of Dec. 5, 1920; the withdrawal of Allied aid to Greece, the flight of Venizelos, all these gave substance to the belief that the persecution of Turkey could not continue. Dissension in the Allied councils was now too plain. The English support of Greece had been uncertain; the French in a year had made a *volte-face* and were openly favorable to Turkey. The purposes of the two countries conflicted sharply, as a result of their imperialistic ambitions in the Near East. All these factors led to an attempt in February, 1921, to revise the Treaty of Sèvres, at the expense of Greece, and for the grudging reconciliation of the Nationalists. Greece, against the advice of the Supreme Council, refused to compromise and in March, 1921, took into her own hands the enforcement of the Treaty of Sèvres. King Constantine, up to his abdication the staunch sympathizer of his imperial brother-in-law, was now fighting the battle of Christendom against the "unspeakable Turk." As the bloody and unnecessary war between Turks and Greeks dragged on during 1921–22, France took the opportunity to seek her own advantage, at the expense of Allied unity. On Oct. 20, 1921, an agreement was signed with the Angora government by which, for the price of withdrawal from Cilicia, the French gained immunity in Syria, as well as important financial and mining rights and a lease of a part of the Bagdad railway. Italy likewise concluded a secret agreement with Angora. In the war in Asia Minor the Greeks were partially successful in 1921; in the summer of 1922, exhausted, poorly led, with a shattered *morale* as a result of the uncertainties of the home situation, the Greeks everywhere gave way, murdering and pillaging as they retired, and in September, were compelled to evacuate the city of Smyrna. Before the end of October the country was free of the invader. (For a discussion of the war, see GREECE.) The alarm of Europe at this turn of events would be difficult to exaggerate. A triumphant Turkey menaced the security of Thrace, Syria, Mesopotamia, Arabia, the well-being of the Christian populations of Asia Minor and the Jews of Palestine, and the peace of mind of the whole Moslem world. Possibly it was the firmness of Great Britain that averted serious trouble if not a general war. Premier Lloyd George strenuously objected to the appearance of a Turkish force in Europe, hastened troops into the Chanak region to oppose a passage into Thrace, and in spite of a studied French and Italian indifference, worked heroically, by a mixture of doggedness and forbearance for the arrangement of a peace. An armistice was signed at Mudania, October 10, which was tantamount to a Turkish triumph, for the Greeks were compelled to evacuate Thrace. The Turks met with the Allies on Nov. 20, 1922, at Lausanne, to draft a definite peace treaty. The conference sat for 11 weeks, broke down in February, 1923, without hope for continuance, it seemed, because of the Turkish rejection of the Allies' proposals, and then resumed sittings on April 23. On July 24 a treaty was signed by Great Britain, France, Italy, Japan, Greece, Rumania, and Turkey which unmistakably revealed the regeneration of the Turkish spirit and the breakdown of Allied unity. In an atmosphere of intrigue which clearly indicated that Europe had learned nothing from the War, a peace was effected which left Turkey secure in Europe and in control of Constantinople, the Bosporus and the Straits Syria, Palestine, Mesopotamia, the Hedjaz, and Yemen were severed from Turkey, the Dodecanese were given to Italy and not to Greece, while Eastern Thrace to the Maritza line and the whole of Anatolia, including Smyrna, were left in Turkish hands. The Capitulations were abandoned in unequal exchange for promises of judicial reform, the Armenians discreetly forgotten, and the Christian problem solved by the elimination of the Christians; that is, provision was made for a wholesale exchange of Turk subjects in Greece for Greek subjects in Asia Minor. Conventions for the regulation of the Straits and the demilitarization of the Greek-Bulgarian-Turkish frontier in Eastern Thrace were also signed.

From the date of the signing of the National Pact on Sept. 13, 1919, which committed Mustapha Kemal and his party to a common programme of reform, to the signing of the Lausanne Treaty, the world witnessed Turkey's transformation not only internationally but internally as well. By the fundamental law of Jan. 20, 1921, all legislative and executive authority was vested in the Grand National Assembly, elected for four years, and established at Angora. By this body Kemal was chosen its president as well as commander-in-chief, first in 1921, and again in 1923. On Nov. 3, 1922, the National Assembly became in name what it had been in effect, the government of Turkey, by the forced abdication of Sultan Mohammed VI, who had ascended the throne in 1918. Abdul

Mejid was then elected Caliph or supreme religious head of the Moslem world, by the National Assembly. The plans of the new government called for the reduction of the tithe on agricultural products and the revision of taxation, reduction of the army and navy to the lowest possible limit, strengthening of the police, improvement of education, etc. The social position of women, in conformity with western ideas, was revolutionized, and even their legal position was given serious attention. Nothing so clearly indicated the parting with the old ways as the readiness with which the Turks surrendered the Caliphate. This office, for centuries held by Ottoman sultans, nominally implied spiritual headship over the entire Moslem world, and had been exploited by the Turkish government during the War in relatively futile efforts to rally all the faithful in a Holy War; but its real importance was grossly exaggerated by public opinion in the Occident. In reality, the Caliph had long been disregarded not only by the schismatic Shiahs of Persia, but by the millions of orthodox Mohammedans in non-Ottoman countries In accordance with their policy of substituting Turkish national patriotism for Ottoman Pan-Islamism, the Nationalists at Angora in March, 1924, deposed Abdul Mejid and renounced the Ottoman claim to the Caliphate. Immediately rival aspirants to the Caliph's vacant office appeared on every hand—the King of Egypt, the Sultan of Morocco, the Aga Khan of Bombay, and the King of the Hedjaz. But the Caliphate remained an unappropriated honor. Toward foreign influence in Turkish affairs, the Assembly, remembering the unfortunate history of the previous two decades, remained hostile, and every project to speed reconstruction by the aid of foreign money was discouraged. For the history of the Chester concession, see CHESTER CONCESSION. For the dispute regarding Mosul, see MESOPOTAMIA. See also the following articles: PEACE CONFERENCE AND TREATIES; SMYRNA; THRACE; CILICIA; ARMENIA; AZERBAIJAN; GEORGIA; ARABIA; PAN-ISLAMISM; PAN-TURANIANISM; CALIPHATE; BAGDAD RAILWAY, GREECE.

TURNER, WILLIAM (1871–). An American Roman Catholic bishop, born at Kilmallock in Ireland. He graduated from the Royal University of Ireland, in 1888 and studied at the American College at Rome and in Paris. In 1893 he was ordained priest and from 1894 to 1906 was professor of philosophy at St. Paul Seminary. From the latter date to 1919 he occupied the same chair at the Catholic University of America. In 1919 he was consecrated bishop of Buffalo. Bishop Turner is the author of *History of Philosophy* (1903), and *Lessons in Logic* (1911). He edited *The American Ecclesiastical Review* and was associate editor of *The Catholic Historical Review.*

TURPAIN, ALBERT CAMILLE LÉOPOLD (1867–). A French physicist, born at La Rochelle, and educated there at the Ecole Fénélon. He became professor of physics at the University of Poitiers and was one of the first to perform experiments in wireless telegraphy. His works include: *Recherches Expérimentales sur les Oscillations Electriques* (1899); *La Télégraphie sans Fil et les Applications Pratiques des Ondes Electriques*, 2d ed. (1908); *Leçons de Physique*, 2 vols., 6th ed. (1920); *Manipulations de Physique* (1908); *Téléphonie* (1909); *Télégraphie* (1910); *La Lumière* (1913); *Vers la Houille Blanche* (1918); and *Manipulations Electro-Techniques* (1920).

TUSKA, GUSTAVE ROBISHER (1869–). An American civil engineer, born in New York City, and educated at the College of the City of New York and at the Columbia University School of Mines. He entered on the practice of his profession as assistant engineer with the Link Belt Engineering Company (1891) and became in 1899 chief engineer of the Panama Railroad and of the Panama Steamship Company. During 1897–1921 he was with the American Process Company in charge of the construction of plants handling waste products and also served as consulting engineer on municipal waste disposal plants in New York, Chicago, Buffalo, St. Louis, Washington, and other cities. During the War he served on the staff of the chief of engineers of the United States Army and was a member of the steel committee of the War Industries Board. During 1915–17 he lectured at Columbia on municipal disposal work and in 1919 was appointed a member of the Mexican Commission by the United States government.

TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE. A nonsectarian, coeducational normal and industrial school for the education of negro youth, at Tuskegee, Ala., founded by Booker T. Washington in 1881. The student enrollment rose from 1527 in 1914 to 2440 in 1923–24 with a summer school for teachers, registering more than 600 annually. In the same period, the faculty increased from 192 to 241 members and the library from 20,000 to 28,000 volumes. The productive funds rose from $1,942,112 to $2,709,110 and the yearly income from $473,764 to $515,412. A group of boys' trades buildings was constructed in 1919 at a cost of $226,000, and the Ellen Curtiss James Hall, a dormitory for girls, and 1920. Junior college courses of three years in agriculture and two years in teacher training and business practice were added to the regular academic course. The Institute received an anonymous gift of $250,000 for permanent improvements in 1916 and $800,000 from the will of Mrs. Russell Sage in 1919. Robert Russa Moton, LL.D, succeeded Booker T. Washington as principal on his death in 1915.

TUTANKHAMEN. It would probably be difficult to discover an Egyptian king of whom less is known historically and who at the same time is better known to the civilized world. The fame is of course due to the discovery of his tomb and its indescribably sumptuous contents by Lord Carnarvon (q.v.) and Howard Carter (q.v) in 1922. This Pharaoh whose funerary furnishings are the most splendid yet discovered belongs chronologically to the end of the eighteenth dynasty. He was the husband of the third daughter of Akhenaten, or Amenhotep, the famous heretic king, and came to the throne a short time before or after the death of his father-in-law—probably after it. We do not know whether he was of royal blood. It is believed that he died when he was hardly more than a boy. At the time of his marriage his wife, Ankh-es-en-pa-Aten, could hardly have been over ten years old. Just how long Tutankhamen ruled is also unknown, though certainly it was at least for six years.

It is common knowledge that Akhenaten, the dreamer, by his substitution of a monotheistic religion had alienated the priestly caste, who

found themselves well in the way of losing power. It is equally well known that in all probability the idealism of the king was incomprehensible to the uneducated, who must have longed for a return to the traditional form of worship of the country During the reign of Akhenaten also, the foreign policies of Egypt lacked vigor, and the Empire abroad was crumbling. It is small wonder that soon after his death there should have been a violent reaction toward the traditionally accepted forms of religion. How soon this took place may be estimated from the fact that on the back of one of the chairs found in the tomb of Tutankhamen appears the symbol of the god Aten, while elsewhere in the same room the name of the youthful ruler is spelled with the ending "amon," showing that the maintenance of his position upon the kingly throne probably required him to return to an allegiance to the older form of worship. In view of his youth it is a matter of speculation how he came to occupy the throne at all. He seems to have been too young to have counted for much on his own part. Perhaps the answer is to be found in the fact that his successor, Aye, who during Tutankhamen's reign was chief priest, represented himself on the wall of the burial chamber of the young king's tomb. Since it is most unusual for any other than the deceased king himself to appear in decorations of his tomb, the suspicion arises that this priest chose to have the young Tutankhamen on the throne as a matter of policy, for the boy would be likely to prove pliable in the hands of this powerful friend of the family, who felt perhaps that the time was not ripe for him to seize the throne for himself.

TUTUILA. See SAMOA, AMERICAN.

"TWENTY-ONE DEMANDS." See CHINA; JAPAN; SHANTUNG.

TYPHOID FEVER. In the War, typhoid in the ordinary course of events would have been a tremendous menace to the troops, but the successful use of mass preventive measures, as carried out in the mobilization of 15,000 United States troops along the Rio Grande when hostilities with Mexico threatened, had shown what can be done in war time. The warring troops were as rapidly as possible immunized against typhoid, the two paratyphoid fevers, and dysentry; usually three serial inoculations were practiced. In addition, the older sanitary measures, such as proper construction of latrines and disposal of feces, antifly campaigns, etc., were practiced. As a result the troops were remarkably free from these infections throughout the War, although it was found that protective inoculation of troops after prolonged exposure to hardships could not always be guaranteed. In civil practice it was shown over and over that combined prophylaxis against typhoid in cities can stamp out the disease even in communities as large as Chicago. The water supply must be pure, and city dwellers about to go on summer vacation and to drink from doubtful wells were urged to subject themselves to preventive inoculation. Campaigns against the house and stable fly were encouraged by health authorities. It is often found that the greatest obstacle encountered in eradicating the disease entirely is the so-called "typhoid carrier" who still harbors the virus about his, or more often her, person, and who is able to contaminate the food supply of houses and institutions. The worst carriers are cooks and others who come in contact with the food.

TYPHUS FEVER. During the War in Europe, knowledge of this affection was notably augmented. Much was also learned from a study of Mexican typhus, which occasionally crosses into the United States; during 1923 there was a small epidemic in southern California. The part played by the louse as the sole medium of transmission became fully realized, and prevention of its spread was effected chiefly by delousing and by the use of approximately louse-proof apparel by those necessarily exposed. A few cases appeared in western Europe during the War but gave no trouble, and it was shown in the intensive antityphus campaign that there were a few cases in Paris which may not have been imported, recalling the so-called Brill's disease sometimes encountered in New York. It was realized that the true virulent disease might run a mild course and that the malignancy of epidemics is due to rapid passage through its victims, facilitated by overcrowding and the low resistance of the patients, who are often in a state of semistarvation. During the War the countries ravaged by typhus were Russia, the Balkans, Poland, and Galicia, and the disease extended eastward into Asia. Its invasion of the rest of Europe was held in check only by the most intensive efforts; only a few hundred cases occurred in mid-Europe. The cause has never been determined, although many organisms have been accused and serological studies have been of use in diagnosis. No specific remedy has been discovered.

TYRWHITT, SIR REGINALD YORKE (1870-). A British admiral, born at Oxford. He joined the navy in 1883 and was promoted through the grades till he reached the rank of rear-admiral in 1919. He had an important part in the War as commander of the destroyer flotillas in actions in Heligoland Bight in August and December, 1914, and off Dogger Bank in 1915.

TYUYAMUNITE. See Article on RADIUM.

U

U BOAT WARFARE. See GERMANY; VESSEL, NAVAL.

UFER, WALTER (1878–). An American painter, born in Louisville, Ky. He studied chiefly at the Royal Academy of Dresden and then in Chicago and at Munich. Returning to the United States, he settled at Taos, N. M., and became known from 1914 as one of the foremost painters of the Pueblo Indians. He paints their life and country with deep and sympathetic insight into the Indian character, in vivid color, and with fine decorative feeling He recently received many awards, including the First Logan Medal of the Art Institute of Chicago (1917); the Altman Prize, National Academy of Design, New York (1921), and the Temple Gold Medal, Pennsylvania Academy, Philadelphia (1923). He is represented in the Public Museums of Brooklyn, Chicago, and Philadelphia; the Corcoran Gallery, Washington, D. C., and in other museums.

UGANDA. A British protectorate in East Africa with an area of 110,300 square miles, including 16,000 square miles of water, and an estimated population (December, 1922) of 3,132,312. Of these, natives numbered 3,125,522, Asiatics, 5529, Europeans, 1261. There were 3651 Asiatics in 1914 and 1017 Europeans. Chief towns are: Mengo, in Kampala (population 40,000); Entebbe, the capital (population 12,000). Cotton continued the most important single activity. In 1913–14 the cotton export was valued at £317,687; in 1921 at £1,281,000; in 1922, at £877,625. Next in order were (exports of 1922): coffee, £99,227; ivory, £47,000 (1921); oilseeds, £41,000 (1921); chillies, £52,768; hides and skins, £26,000 (1921); rubber, £3741. Coffee and rubber production showed advances particularly as a result of European interest. The total exports in 1922 were £1,215,793 as compared with £524,260 in 1913–14. After 1917, the customs administrations of Uganda and Kenya were combined and imports were credited to the Kenya Colony. Revenues for 1913–14 were £256,559 and expenditures £290,180; for 1923 (estimate) these were £879,050 and £1,062,871. The poll tax accounted for the greater part of the revenues in the postwar years. The debt was £844,895 in December, 1922. After 1914 a cessation was made of imperial grants-in-aid. British penetration into the interior continued so that by 1915 almost the whole protectorate was, with the exception of Rudolf province, well in hand During the War, great numbers of natives (estimated at 150,000) saw service as carriers in the African campaigns. In 1921, a legislative council, made up of nominated members, met for the first time. The Indians refused to participate because of the social and economic segregation to which they were subjected. See KENYA COLONY.

UKRAINE. While the Ukrainians had some claim to self-determination on the grounds of language, it is doubtful whether socially and culturally they formed a distinct and homogeneous nation. Before the War, there were some 35,000,000 of them in central-eastern Europe. In Russia, 30,000,000 were to be found; 3,500,000 in Austria, in Galicia and Bukovina chiefly, and known more commonly as Ruthenians; and 500,000 in Hungary. In Hungary, their national consciousness had been kept alive by the repressive policy of the Magyars; in eastern Galicia, because of their hatred of the Poles, they clung to their language, religion and folkways (see GALICIA; POLAND.) In Russia, with the beginning of the twentieth century, there began to appear evidences of a tenderly fostered and not very virile Ukrainian movement that aimed at regional automony. Though most of the Ruthenians in Galicia were peasants and 60 per cent were illiterate, Lemberg became the cultural seat of the agitation and from it radiated thin lines of influence into the Russian provinces. The break-up of the Russian empire gave the Ukrainians their long sought opportunity. The independence of Russian Ukraine was proclaimed on Nov. 21, 1917; that of Austrian Ukraine, on Nov. 19, 1918; on Dec. 14, 1918, the government of Ukraine, a directory of five members, was set up as a provisional government; and on Jan. 3, 1919, the union of Eastern (Russian) and Western (Austrian) Ukraine took place. Though the Ukrainians had been recognized as constituting a nation by Russia and the Central Powers in the Brest-Litovsk treaties (March, 1918), they were pointedly refused a hearing by the Paris Peace Conference. In fact, they were compelled to see their hopes vanish as the commissioners apportioned out territories they claimed as peculiarly their own. To Rumania, Czecho-Slovakia, and Poland went Bessarabia, the Carpathian Ruthenians, Bukovina, and Galicia. The region itself was never for long under a single rule nor did it, until 1922, enjoy any surcease from the trials of war. In 1919, the central government, under Hetman Petlura, was waging war against the Poles. In 1920, the Ukraine joined arms with Poland against Russia with the result that its representatives were signatory to the treaty of Riga (October, 1920), by which the region's independence was recognized by both powers. However, by the treaty the Polish boundary was pushed so far east that Galicia and Volhynia were lost to the Ukraine. Petlura's government continued to exist for a time; but gradually power was being accumulated in the hands of a Soviet which made its appearance first in 1920. Nothing quite so completely revealed the incompetence of any group to rule as the ease with which bandits made the country their prey. From 1919 on, armed forces terrorized the countryside. The Jews in particular were singled out as vic-

tims, the tale of their suffering being possibly the darkest of all those miserable annals with which the history of central and eastern Europe was filled in the three years following the Armistice. In the words of the Chief Rabbi of the British empire: "150,000 human beings were bayoneted, bombed, buried alive, drowned, thrown alive into lime pits, and subjected to the most diabolical tortures that only a Dantesque imagination could conceive" Not until 1922 was it evident that the country was settling down to a peaceable activity, and this was due only to the loss of its national identity, for on Dec. 30, 1922, delegates from the Ukraine in company with those of Russia, White Russia and the Transcaucasian Federation completed a treaty by which the Union of Socialist Soviet Republics was set up. From thence on the history of the Ukraine was, more properly, that of Russia. Economically, there was every justification for the federation; for, while the Ukraine possesses great wheat, barley, and sugar fields, as well as valuable coal and iron deposits, it is, like the other Russian regions, dependent upon the oil from Baku, the lumber of the northern forests, Siberia's dairy products, and the cotton of Transcaucasia and Turkestan. See RUSSIA.

ULSTER. See IRELAND.

ULTRAMODERNISTS, IN MUSIC. See MUSIC.

UNCONSCIOUS MIND. See CONSCIOUSNESS AND THE UNCONSCIOUS.

UNDERWOOD, OSCAR WILDER (1862–). An American legislator (see VOL. XXII). He was first elected to the Senate in 1915, after serving 20 years in the House of Representatives. He was Democratic leader of the Senate in the 67th and 68th Congresses until he resigned this post in 1923. He served as American delegate to the Conference for the Limitation of Arms in 1921–22. In 1924 he was a candidate for the presidential nomination.

UNDERWOOD TARIFF BILL. See TARIFF IN THE UNITED STATES; UNITED STATES, *History.*

UNEMPLOYMENT. The decade 1914–24 saw severe unemployment crises, especially in the years following the War. In the belligerent European countries unfavorable conditions of employment gave way during the War to less than normal unemployment, because of the drafting of many millions of workers into the armies, the stimulation of many lines of production by military needs, and the establishment of central control in industry. Neutral countries which were in a position to cater to the military needs of the belligerents enjoyed a rather lasting war prosperity. The most severe crises of unemployment occurred a few years after the Armistice when the war prosperity came to an end and the after effects of the War threw the industrial machinery of the world into violent disorders. Millions of men returned from the front seeking their old positions, while the substitutes who had taken their places during the War clung tenaciously to their new means of livelihood. The great postwar unemployment crisis began to accumulate force in 1920 and was still existent in 1924 in some countries like Great Britain and Germany. The occupation of the Ruhr was a potent cause of renewed unemployment.

United States. Chiefly as a result of the War, the United States experienced its most severe unemployment crisis in many years in 1914 and the early part of 1915. The unemployed constituted 15.8 per cent in 1914, and 16 per cent in 1915, of the total labor force. In New York alone their number was variously estimated at from 140,000 to 500,000. Numerous emergency measures were instituted by city governments, committees of citizens, and diverse leagues and associations. The very sharp upward turn in business, however, during the summer and the early fall of 1915 had a very wholesome effect on the labor market, and employment conditions improved rapidly, chiefly because of the enormous manufacture of munitions. This improvement continued during 1916 and 1917 when the proportion of the unemployed to the total labor force was 7.1 per cent and 4.7 per cent, respectively. In 1917 there was great scarcity of labor and consequently a great demand for it. This was due both to the drafting of millions of men into the military service and the great increase in industrial activity. This situation remained unchanged until the late fall of 1918 when some of the employers began to lay off their workmen, although there was still a great deal of demand for manufactured products and the labor market continued to be good until the early fall of 1920 At that time there was considerable curtailment of production and many workers were thrown into unemployment. Statistics show that in September, 1920, there occurred in many important industries decreases of from 4 to 14 per cent in the employment. Unemployment gained momentum in the last months of the year and reached its maximum intensity in January and February, 1921. The outstanding event of this latter year in the unemployment situation was President Harding's National Unemployment Conference in October, which set unemployment before the country in an official way as being chiefly a problem of industry. The conference estimated the number of unemployed at from 3,500,000 to 5,000,000. During this period Michigan had the greatest decrease in employment with 82 per cent, and Ohio and Indiana with 50 per cent Secretary of Labor James J. Davis estimated the unemployed in the beginning of 1922 at between 5,000,000 and 6,000,000, but this figure is probably an exaggeration. During the course of 1922 the situation improved materially. In 1923, unemployment declined still further and production became normal. The United States Bureau of Labor Statistics published in recent years a study of the extent and the causes of unemployment, which summed up the situation as follows: "Industrial wage earners in those States for which data are available lose about 10 per cent of their working time through unemployment, mainly from lack of work and exclusive of idleness due to slackness and labor disputes. On this basis an average of at least a million and a half industrial wage earners in the United States are constantly unemployed, taking poor and prosperous years together."

Great Britain. From the outbreak of the War, until 1917, unemployment declined steadily in Great Britain. In the first seven months of the latter year the percentage of unemployment among trade unions paying unemployed benefits averaged less than one-third of one per cent as compared with an average of nearly four per cent during the preceding 10 years. After August, 1917, the number of unemployed increased, and in 1919 the situation became seri-

ous due to the rapid demobilization. Following upon this unfavorable condition of the labor market there came an interval of about eight months during which the rate of unemployment was low. But in the autumn of 1920 the most acute crisis, that of unprecedented unemployment, began. It was still grave in 1924. In June, 1921, the number of men out of work, entered on the insurance list, was 2,177,000, and those partially unemployed were 998,000. The average of the unemployed during 1922 and 1923 was 1,500,000. While the direct causes of the great unemployment crisis in Great Britain must be sought in the War and its after effects, the general cause of it was the excess of the industrial population which during the eight previous years had not been able to flow through the channels of emigration into employment abroad. The government instituted various relief measures. The main principle of its policy was the extension of compulsory unemployment insurance. The chief official sources of relief in 1924 were: (1) national schemes of work or assistance; (2) local schemes of work; (3) poor law relief; (4) unemployment insurance.

Germany. The employment situation in Germany was very bad in the fall of 1914, but it improved steadily during the four years of the War, due primarily to government efforts. The rapid demobilization at the end of the War caused a serious unemployment crisis. The government started various measures for relief and in six months there was a marked improvement. The number of the unemployed was reduced from 1,500,000 at the beginning of 1919 to 500,000 at the end of the year. During the following years the labor market continued to gain. The ratio of unemployed to the total number of workingmen was reported to be less than one per cent during the first seven months of 1922. After that an increase in unemployment occurred, and at the end of 1923 there were 3,000,000 without work; 60 per cent of the workers were employed only two or three days a week during that year. See other countries of Europe for similar figures. See also SOCIAL INSURANCE.

UNIFLOW ENGINE. See STEAM ENGINES AND TURBINES.

UNION COLLEGE. A nonsectarian institution for men at Schenectady, N. Y., founded in 1795. The student enrollment increased from 474 in 1914 to 728 in 1923–24, the faculty increased during the decade from 38 to 65 members and the library from 43,000 to 62,000 volumes. The productive funds increased approximately 163 per cent from $950,000 to $2,500,000. President, Charles Alexander Richmond.

UNION OF SOCIALIST SOVIET REPUBLICS. See RUSSIA.

UNION OF SOUTH AFRICA. See SOUTH AFRICA, UNION OF.

UNITARIANS. In the United States this denomination developed within New England Congregationalism. The American Unitarian Association, organized in May, 1825, for missionary purposes, became the executive arm of the denomination. The Unitarian church imposes no theological test of membership on either the laity or clergy. It had three divinity schools throughout the decade 1914–24 as well as the Tuckerman School for the training of parish assistants, the Hackley School at Tarrytown, Proctor Academy at Andover, N. H., and several philanthropic organizations. Instead of foreign missions it conducted a department of foreign relations, which kept in touch with and often extended aid to the liberal religious movements in other lands, such as South America, the countries of northern and central Europe, Italy, Egypt, India, China, Japan. It maintained departments of religious education, social service, new Americans, and a publishing department. There were also the Alliance of Unitarian and Other Liberal Christian Women, and the Laymen's League. The basis of its membership differs so widely from established custom that the term communicants is rejected and adherents used as more nearly correct. According to figures issued by the denomination, covering Dec. 31, 1923, there were 119,000 adherents, 398 active churches, 29 inactive churches, 12 preaching stations, and 483 clergymen. According to the Federal Census of 1916, there were 82,515 members, 399 church edifices, 414 organizations, and 483 clergymen. Headquarters were at 25 Beacon Street, Boston, Mass.

UNITED BRETHREN IN CHRIST. An outgrowth of the German Reformed and Mennonite Churches, organized in Maryland in 1800, and later divided into two bodies, the Old and the New Constitutions In polity and theology the United Brethren in Christ is similar to the Methodist Episcopal Church. During the 10 years 1913–23, inclusive, the membership of the Old Constitution remained practically stationary at approximately 20,000. The membership of the New Constitution increased from 310,886 in 1913 to 379,314 in 1923; the Sunday school enrollment from 382,388 to 433,610, and the members of the Christian Endeavor Society from 86,051 to 96,585. The aggregate salaries of ministers increased from $1,113,114 to $2,202,515; the giving to benevolences from $452,570 to $1,384,649; and the giving for all purposes from $2,914,313 to $6,315,993. During the period the United Brethren Church, New Constitution, was building up three homes for orphaned children, which had an aggregate of 4250 acres of land and property valued at $1,193,000. A preachers' pension plan, recently adopted, was being standardized in 1924.

UNITED KINGDOM. See GREAT BRITAIN.

UNITED PRESBYTERIAN CHURCH OF NORTH AMERICA. This denomination was formed in 1858 through the union of the Associate and Associate Reformed Churches. In organization and government it is in accord with other Presbyterian bodies. During the decade, 1914–24, its development was as follows, taking into account American churches only. The membership increased from 148,220 to 165,186; the number of congregations declined from 988 to 924; the number of ministers from 999 to 937; the number of presbyteries from 64 to 58; the number of Sabbath schools from 1001 to 929; the number of pupils increased from 146,262 to 171,922; the young people's societies increased from 899 to 918, and decreased in membership from 31,489 to 26,837; the contributions of the American church increased from $3,129,076 to $5,845,370.

Missions were maintained in India, Egypt, the Sudan, and Abyssinia. The statistics of these mission fields showed 11 presbyteries; 235 ministers; 183 congregations; 341 mission stations; 56,534 communicants; contributions of mission congregations, $122,150; 123 young people's societies, with a membership of 5041; 392 Sabbath schools, with 26,629 pupils en-

rolled. The matter of union with other Presbyterian bodies was under consideration during the decade, but all that was accomplished was in the line of much more closely federated work. A New World Movement was inaugurated in 1919, for the purpose of securing dedication of life and the enlistment of prayer, and the endowment of the educational and missionary work of the Church. The subscriptions of the churches to this movement amounted to $11,000,000. A committee was appointed in 1919 to prepare a new Confessional Statement for the denomination. The General Assembly of 1924 adopted this revised statement with the exception of one article and the preamble, which went over to the next meeting of the General Assembly.

UNITED STATES OF AMERICA. The United States of America consists of 48 states and the District of Columbia, located between the 25th and 49th parallels of latitude north, and in addition the noncontiguous territories of Alaska, Hawaii, Guam, Panama Canal Zone, Philippine Islands, Porto Rico, American Samoa and the Virgin Islands. The total land area of continental United States exclusive of Alaska is 2,973,800 square miles, and the population at the 1920 census was 105,710,620. The areas and population of the noncontiguous territories are given in Table I.

TABLE I—AREA AND POPULATION OF THE UNITED STATES

Territory	Area Square miles	Population in 1920
Continental United States ..	2,973,774	105,710,620
Alaska	590,884	55,036
Guam	210	13,275
Hawaii	6,449	255,912
Panama Canal Zone	527	22,858
Philippine Islands	115,026	10,607,872
Porto Rico	3,435	1,299,809
American Samoa	77	8,056
Virgin Islands	132	* 26,051
Total	3,690,514	117,999,489

* Nov. 1, 1917.

POPULATION

The United States is the only important country of the world which has even a fairly complete history of the growth in population from its beginning. The first Federal census was taken in 1790 and subsequent enumerations at 10-year intervals. In 1790, the total population of the United States as then constituted was 3,929,214 and at the last census in 1920 it was 105,710,670, an increase of 2565 per cent for the 130 years. Table II gives the population of continental United States at each census, together with the actual and percentage increase for each decade.

The Bureau of the Census estimates the total population for intercensal years and periods. Table III shows the estimated total population of continental United States on July 1 of each year from 1910 to 1924.

TABLE II—POPULATION OF THE UNITED STATES, WITH DECENNIAL INCREASE 1790–1920

Census year	Population	Total decennial increase	Per cent of increase
1790	3,929,214	...	.
1800	5,308,483	1,379,269	35.1
1810	7,239,881	1,931,398	36.4
1820	9,638,453	2,398,572	33.1
1830	12,866,020	3,227,567	33.5
1840	17,069,453	4,203,433	32.7
1850	23,191,876	6,122,423	35.9
1860	31,443,321	8,251,445	35.6
1870	* 39,818,449	* 8,375,128	* 26.6
1880	50,155,783	* 10,337,334	* 26.0
1890	62,947,714	12,791,931	25.5
1900	75,994,575	13,046,861	20.7
1910	91,972,266	15,977,691	21.0
1920	105,710,620	13,738,354	14.9

* Estimated correction for error in census of 1870.

TABLE III—ESTIMATED TOTAL POPULATION ON JULY 1 FOR INTERCENSAL YEARS

Year	Population July 1	Year	Population July 1
1910.....	92,267,000		
1911.....	93,682,000	1918.....	103,588,000
1912	95,097,000	1919.....	105,003,000
1913.....	96,512,000	1920.....	106,418,000
1914..	97,927,000	1921.....	107,833,000
1915.....	99,343 000	1922.....	109,248,000
1916.....	100,758,000	1923	110,663,000
1917.....	102,173,000	1924.....	112,800,000

From 1790 to 1860 the population showed a relatively uniform rate of growth amounting to an increase of about one-third per decade Had this ratio of increase continued after 1860 the total population of continental United States in 1920 would have been upwards of 180,000,000.

The decline in the percentage rate of increase in the first three decades following the Civil War was very gradual. From 1860 to 1890, the average increase was approximately 26 per cent per decade. For 1890 to 1900, the rate dropped to 20.7 per cent. From 1900 to 1910, it was at 21 per cent, but for the decade between 1910 and 1920, the rate of increase showed a marked decline to 14.9 per cent. This sharp decline in the rate of increase for that decade is partly due to the decline in immigration and to the return of many former immigrants to their native land, during the War However, even if the effect of immigration and emigration is allowed for there has been a very significant decline in the rate of population increase during that last decade. (See discussion by W. S. Rossiter: "Increase of Population in the United States." *Census Monograph No. 1*, Bureau of the Census, Department of Commerce, 1922.) If the decline in the rate of increase for the next decade should be as large as for the one just passed the increase shown by the fifteenth census in 1930 would be less than 9 per cent

The United States has passed the pioneer stage of development and it is probable that future censuses will continue to show moderate rates of increase characteristic of more fully settled and developed countries. The rates of increase in population for England and Belgium before the War were between 10 and 11 per cent, while Germany increased 15 per cent, Italy 6.6 per cent and France only 1.6 per cent per decade.

It is of interest to note, however, that although the rate of increase has been rapidly declining the actual numerical increase in population has been relatively stationary for the past four decades. The largest numerical increase recorded for any decade was 15,977,691 between 1900 and 1910. Between 1910 and 1920, the increase was 13,738,354. On the average, therefore, the United States is adding about 1,400,000 persons to its population each year or almost 4000 persons per day. The increase alone during any one of the last four decades was

greater than the entire population of the country in 1830.

Increase in Population by Geographic Divisions, States and Cities. The distribution of population by geographic divisions and individual States for 1910 and 1920 and the increases for this decade with comparisons with the percentage increase in the preceding decade are shown in Table IV.

migration of population compared with the period between 1900 and 1910. In the last mentioned decade the population of the Pacific States increased 73.5 per cent and the Mountain States 57.3 per cent. Between 1910 and 1920, these two divisions continued to show higher percentages of increase than other sections of the country but the rates of increase declined to 32.8 and 26.7 per cent respectively. Only one

TABLE IV—INCREASE OF POPULATION, BY DIVISIONS AND STATES: 1910–1920

Division and State	Population 1920 Number	1920 Per cent of total	Population 1910 Number	1910 Per cent of total	Increase [a] 1910 to 1920 Number	Increase [a] 1910 to 1920 Per cent	Per cent of increase 1900 to 1910
United States	105,710,620	100 0	91 972,266	100 0	13,738,354	14 9	21.0
Geographic Divisions							
New England	7,400,909	7 0	6,552,681	7 1	848,228	12 9	17.2
Middle Atlantic	22,261,144	21 1	19,315,892	21 0	2,945,252	15 2	25.0
East North Central	21,475,543	20 3	18,250,621	19.8	3,224,922	17 7	14.2
West North Central	12,544,249	11.9	11,637,921	12 7	906,328	7 8	12 5
South Atlantic	13,990,272	13 2	12,194,895	13 3	1,795,377	14 7	16 8
East South Central	8,893,307	8.4	8,409,901	9 1	483,406	5 7	11 4
West South Central	10,242,224	9.7	8,784,534	9.6	1,457,690	16 6	34.5
Mountain	3,336,101	3 2	2,633,517	2.9	702,584	26 7	57.3
Pacific	5,566,871	5 3	4,192,304	4 6	1,374,567	32 8	73 5
New England							
Maine	768,014	0 7	742,371	0.8	25,643	3 5	6 9
New Hampshire	443,083	0.4	430,572	0.5	12,511	2 9	4 6
Vermont	352,428	0 3	355,956	0 4	−3,528	−1 0	3.6
Massachusetts	3,852,356	3.6	3,366,416	3 7	485,940	14 1	20 0
Rhode Island	604,397	0.6	542,610	0 6	61,787	11 4	26.6
Connecticut	1,380,631	1 3	1,114,756	1 2	265,875	23 9	22 7
Middle Atlantic							
New York	10,385,227	9 8	9,113,614	9 9	1,271,613	14 0	25 4
New Jersey	3,155,900	3.0	2,537 167	2 8	618,733	24.4	34.7
Pennsylvania	8,720,017	8 2	7,665,111	8.3	1,054,906	13 8	21 6
East North Central							
Ohio	5,759,394	5 4	4,767,121	5 2	992,273	20 8	14.7
Indiana	2,930,390	2 8	2,700,876	2.9	229,514	8 5	7.3
Illinois	6,485,280	6 1	5,638,591	6.1	846 689	15 0	16.9
Michigan	3,668,412	3 5	2,810,173	3.1	858,239	30 5	16 1
Wisconsin	2,632,067	2 5	2,333,860	2 5	298,207	12 8	12 8
West North Central							
Minnesota	2,387,125	2 3	2,075,708	2 3	311,417	15 0	18.5
Iowa	2,404,021	2 3	2,224,771	2 4	179,250	8 1	−0 3
Missouri	3,404,055	3 2	3,293,335	3 6	110,720	3 4	6.0
North Dakota	646 872	0 6	577,056	0 6	69,816	12 1	80 8
South Dakota	636,547	0 6	583,888	0 6	52,659	9 0	45.4
Nebraska	1,296,372	1.2	1,192,214	1 3	104,158	8 7	11 8
Kansas	1,769,257	1 7	1,690,949	1.8	78,308	4 6	15.0
South Atlantic							
Delaware	223,003	0 2	202,322	0 2	20,681	10 2	9.5
Maryland	1,449,661	1 4	1,295,346	1 4	154,315	11 9	9.0
District of Columbia	437,571	0 4	331,069	0 4	106,502	32.2	18.8
Virginia	2,309,187	2.2	2,061,612	2.2	247,575	12 0	11.2
West Virginia	1,463,701	1 4	1,221,119	1 3	242,582	19 9	27.4
North Carolina	2,559,123	2 4	2,206,287	2.4	352,836	16 0	16.5
South Carolina	1,683,724	1 6	1,515,400	1 6	168,324	11 1	13.1
Georgia	2,895,832	2 7	2,609,121	2 8	286,711	11 0	17.7
Florida	968,470	0 9	752,619	0.8	215,851	28 7	42.4
East South Central							
Kentucky	2,416,630	2.3	2,289,905	2 5	126,725	5.5	6.6
Tennessee	2,337,885	2.2	2,184,789	2 4	153,096	7 0	8.1
Alabama	2,348,174	2 2	2,138,093	2 3	210,081	9.8	16.9
Mississippi	1,790,618	1.7	1,799,114	2 0	−6,496	−0.4	15.8
West South Central							
Arkansas	1,752,204	1 7	1,574,449	1 7	177,755	11 3	20.0
Louisiana	1,798,509	1.7	1,656,388	1 8	142,121	8.6	19.9
Oklahoma	2,028,283	1.9	1,657,155	1 8	371,128	22.4	109 7
Texas	4,663,228	4.4	3,896,542	4 2	766,686	19.7	27.8
Mountain							
Montana	548,889	0.5	376,053	0.4	172,836	46.0	54.5
Idaho	431,866	0.4	325,594	0.4	106,272	32.6	101.3
Wyoming	194,402	0.2	145,965	0.2	48,437	33.2	57.7
Colorado	939,629	0.9	799,024	0.9	140,605	17.6	48 0
New Mexico	360,350	0 3	327,301	0 4	33,049	10 1	67.6
Arizona	334,162	0 3	204,354	0.2	129,808	63 5	66.2
Utah	449,396	0.4	373,351	0.4	76,045	20.4	34.9
Nevada	77,407	0.1	81,875	0.1	−4,468	−5.5	93.4
Pacific							
Washington	1,356,621	1.3	1,141,990	1.2	214,631	18.8	120.4
Oregon	783,389	0.8	672,765	0.7	110,624	16.4	62.7
California	3,426,861	3.2	2,377,549	2 6	1,049,312	44.1	60.1

[a] A minus sign (−) denotes decrease.

It is clear from the data in this table that there was a decided slackening in the westward of the nine geographic divisions showed a rate of increase in the last decade higher than in

the decade 1900 to 1910. This was the East North Central Division consisting of the States of Ohio, Indiana, Illinois, Michigan, and Wisconsin. This was the region which showed the most notable industrial expansion of this period. In marked contrast is the low rate of increase shown for the East South Central States and the West North Central Division. In the former region the northward migration of Negroes during and after the War was at least partly responsible for the low rate. In the West North Central States the decline in the rate of increase was largely due to stabilized agriculture and absence of any marked industrial development.

The largest numerical increase occurred in the East North Central States with a total of 3,224,072 more persons than in 1910. The Middle Atlantic States reported the next largest increase amounting to 2,045,252; the South Atlantic Division increased 1,795,377, while the West South Central and the Pacific Divisions each increased approximately 1,400,000.

Of the 48 states of the Union, 45 showed increases of population from 1910 to 1920. The three reporting decreases were Mississippi, 0.4 per cent, Vermont, 1 per cent, and Nevada, 5.5 per cent. The largest rate of increase for any State was 63.5 per cent in Arizona, followed by Montana with 46 per cent, California with 44.1 per cent, Wyoming with 33.2 per cent, Idaho with 32.6 per cent, and Michigan with 30.5 per cent. Six other states—Florida, New Jersey, Connecticut, Oklahoma, Ohio, and Utah—each showed rates of increase between 20 and 30 per cent for the decade.

Aside from the three states showing decreases, the five states showing the lowest rates of increase were New Hampshire, 2.9 per cent; Missouri, 3.4 per cent; Maine, 3.5 per cent; Kansas, 4.6 per cent; and Kentucky, 5.5 per cent.

Eight states contributed more than half of the total increase of 13,738,354 shown at the last census. These in the order of their contributions were: New York, Pennsylvania, California, Ohio, Michigan, Illinois, Texas, and New Jersey. The first three each showed an increase of over 1,000,000 persons, while in the other five the increase ranged between 600,000 and 1,000,000 each.

At the 1920 census, there were 2500 cities in the United States having a population between 2500 and 25,000; 219 cities having from 25,000 to 100,000 inhabitants, and 68 having more than 100,000 persons. During the 10-year period 1910 to 1920, 474 towns and other communities passed, because of population increases, into the class of cities having 2500 to 25,000 inhabitants. During the same period, 59 cities passed from this class into that having 25,000 to 100,000 population, while 18 left this class for the one comprised of cities of over 100,000.

By far the larger portion of the large cities is located in the Eastern and Central industrial States. At the 1920 census, 38 out of the 68 cities of over 100,000 inhabitants were located in the three geographic divisions of New England, Middle Atlantic and East North Central States. These 38 cities had a total population of approximately 19,500,000 out of an aggregate for the group of 27,500,000. Also 144 out of the 219 cities in the class 25,000 to 100,000 were located in these three divisions and they furnished 6,500,000 out of the 10,340,000 inhabitants in this class of cities.

Of the 68 cities having 100,000 or more inhabitants in 1920, there were 25 which had a population of 250,000 or over. A study of the changes in the population of these 25 cities at the last two censuses illustrates the changing trends in large urban populations for the last two decades.

TABLE V—POPULATION OF CITIES HAVING 250,000 INHABITANTS OR MORE IN 1920, WITH INCREASE AND RANK 1920 AND 1910

City	Population		Increase 1910–1920		Rank	
	1920	1910	Number	Per cent	1920	1910
New York	5,620,048	4,766,883	853,165	17 9	1	1
Chicago	2,701,705	2,185,283	516,422	23 6	2	2
Philadelphia	1,823,779	1,549,008	274,771	17 7	3	3
Detroit	993,678	465,766	527,912	113.3	4	9
Cleveland	796,841	560,663	236,178	42 1	5	6
St. Louis	772,897	687,029	85,868	12 5	6	4
Boston	748,060	670,585	77,475	11 6	7	5
Baltimore	733,826	558,485	175,341	31.4	8	7
Pittsburgh	588,343	533,905	54,438	10 2	9	8
Los Angeles	576,673	319,198	257,475	80 7	10	17
Buffalo	506,775	423,715	83,060	19 6	11	10
San Francisco	506,676	416,912	89,764	21 5	12	11
Milwaukee	457,147	373,857	83,290	22 3	13	12
Washington	437,571	331,069	106,502	32 2	14	16
Newark	414,524	347,469	67,055	19 3	15	14
Cincinnati	401,247	363,591	37,656	10 4	16	13
New Orleans	387,219	339,075	48,144	14 2	17	15
Minneapolis	380,582	301,408	79,174	26 3	18	18
Kansas City, Mo.	324,410	248,381	76,029	30 6	19	20
Seattle	315,312	237,194	78,118	32 9	20	21
Indianapolis	314,194	233,650	80,544	34 5	21	22
Jersey City	298,103	267,779	30,324	11 3	22	19
Rochester	295,750	218,149	77,601	35 6	23	25
Portland, Ore.	258,288	207,214	51,074	24.6	24	28
Denver	256,491	213,381	43,110	20.2	25	27

Only four out of these 25 cities retained the same ranks in 1920 as they had in 1910, while 10 improved their positions and 11 took lower ranks than in 1910. Detroit moved from ninth up to fourth place, Los Angeles from 17th to 10th, while two cities, Portland, Oregon, and Denver, which were outside the first 25 in 1910, moved into this class in 1920.

Urban and Rural Population. There has long been observed in the United States a strong movement of population from the country to the city and this tendency seems to be increasing. The census defines urban population as that living in cities or other incorporated places of 2500 inhabitants or more.

In 1790, this country was substantially all rural. Only six cities had a population of 8000 or more. From this time urban population has been increasing until at the 1920 census more

than half of the population lived in cities of 2500 or over. Even as recently as 1880, 71 4 per cent of the population was rural and only 28.6 urban. In 1890 the proportions were 63.9 per cent rural and 36.1 per cent urban; by 1900 the latter proportion had moved to 40 per cent and in 1910 to 45.8 per cent. In 1920, for the first time, urban population passed the highway mark, forming 51.4 per cent of the total, while rural population made up only 48.6 per cent. Between 1910 and 1920 urban population increased by over 12,000,000 or 28.8 per cent, while the rural population increased only 1,600,000 or 3.2 per cent. Part of this increase in urban population was due to the fact that 474 small towns which in 1910 had less than 2500 inhabitants had passed this mark by 1920 and were included as urban. However, even if allowance is made for this, the predominating increase in urban population is still evident showed a decidedly larger increase than the urban class.

Changes in Population Considered by Sex, Nativity and Color. The following tabulation shows the sex distribution of the population of continental United States at each of the last three censuses:

Census year	Males	Females	Males to 100 females
1900	38,816,448	37,178,127	104 4
1910	47,332 277	44 639,989	106 0
1920	53,900,431	51,810 189	104.0

It is a peculiarity of population statistics that the number of males in nearly all instances exceed the number of females. This has been true of every census of the United States since 1830, when for the first time the returns showed the sex of every person enumerated. In 1920

TABLE VI—INCREASE IN URBAN AND RURAL POPULATION: 1890–1920

Census	URBAN Total	URBAN Increase	URBAN Per cent of increase	Per cent urban	RURAL Total	RURAL Increase	RURAL Per cent of increase
1890	22,720,223			36 1	40,227,491		
1900 .	30,380,433	7,660,210	34.2	40 0	45,614,142	5,386,651	13 4
1910 . .	42,166,120	11,785,687	38.8	45 8	49,806,146	4,192,004	9 2
1920 .	54,304,603	12,138,483	28 8	51 4	51,406 017	1,599,871	3 2

If the population living in all incorporated places instead of that in places of 2500 and over had been considered as urban, the total urban population in 1920 would have been 63,277,000 or 59.9 per cent of the total and the rural population only 42,434,000 or 40.1 per cent On this basis the corresponding proportions in 1910 were 54.7 and 45.3 per cent.

In 1920, the census for the first time compiled the numbers of persons living on farms or the total agricultural population. This figure was 31,614,219 or 30 per cent of the total population, and 61.5 per cent of the population classified as rural.

For the decade 1910 to 1920, the movement from rural to urban continued to be heaviest in the areas in which it began, i.e. the industrial North Eastern and North Central States The three groups New England, Middle Atlantic and East North Central States showed a stationary rural population from 1900 to 1910 and slight decreases for 1910 to 1920, while all of the heavy increases in these sections fell to the urban population. Even in the three southern divisions of the country the increase in urban population in the last decade far exceeded the rural. Likewise, in the Pacific States, the urban increase was much greater than the rural. It was the number of males exceeded by more than 2,000,000 the number of females, which was a considerably smaller excess than in 1910 when the males exceeded females by nearly 2,700,000 Also, the proportion of males to females was lower in 1920 than in any of the three preceding censuses. A similar decrease in the proportion of males was noted after the Civil War in the decade between 1860 and 1870. No doubt the greater mortality of males due to the war, the emigration of more males than females and perhaps an increase in the proportion of female immigrants tended to affect the 1920 ratio. The statistics show that about three-fifths of the decrease in the excess of males in 1920 was among the foreign-born white population.

With regard to nativity and color, the census divides the population into the following chief groups: (1) native whites of native parentage; (2) native whites of foreign parentage; (3) native whites of mixed parentage, (4) foreign-born whites and (5) colored, separating the latter two classes by nationality. It would lie too far outside the scope of this article to treat this subject in detail. The accompanying table gives the more important classes and the rates of increase in each since 1890 in comparison with the total.

TABLE VII—GROWTH OF WHITE AND COLORED ELEMENTS IN POPULATION

Census year	Total population	Per cent of increase	Whites	Per cent of increase	Native Whites	Per cent of increase	Of native parents	Per cent of increase	Foreign born	Per cent of increase	Colored	Per cent of increase
1890.....	62,947,714	24 9	55,101,258	26 7	45,979,391	24 5	34,475,716	20 2	9,121 867	39.1	7,864,456	16.2
1900 ...	75,994,575	20 7	66,809 196	21 2	56,595 379	23.1	40,949 362	18.8	10,213,817	12 0	9,185,379	17 1
1910	91,972,266	21 0	81,731,957	22 3	68,386,412	20.8	49,488,575	20 8	13,345,545	30 7	10,240,309	11 5
1920	105,710,620	14 9	94,820,915	16.0	81,108,161	18.6	58,421 957	18 1	13,712.754	2 8	10,889 705	6 3

only in the mountain group of States (Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada) that the rural element

It is of interest to note that the rate of increase of whites in the decade 1910 was 18.6 per cent compared with 14.9 for the total

population. For native whites of native parents the rate of increase was 18.1. For the two classes not shown in the table, the native whites of foreign parentage increased by 21.5 per cent, a higher rate than that for any other group of the white population. In many urban and industrial sections the rate of increase in this class of the population exceeded 30 per cent.

In 1920, the foreign-born white population totaled 13,712,754, which represented an increase of only 2.8 per cent over those shown in this class at the 1910 census. Foreign-born whites in 1920 formed only 13 per cent of the total population but it is significant to note that of the adult male population over 21 years of age, they formed 22.1 per cent or over one-fifth of the total.

The colored population increased only 6.5 per cent in this decade, as compared with 11.5 per cent in the preceding decade. The total colored population in 1920 numbered 13,712,754, of which 10,463,131 were Negroes, 244,437 American Indians, 111,010 Japanese, 61,639 Chinese. The increase in the total Negro population from 1910 to 1920 was only 635,000 or 6.5 per cent, the lowest ever recorded. The number of Indians declined by 21,246 in the last decade while the Japanese increased 38,853 or 54 per cent, and the Chinese decreased by 9892.

Persons Gainfully Employed. In connection with the decennial enumeration, the Bureau of the Census also compiles the number of persons engaged in specified gainful occupations. These occupations are classified into nine main groups. The 1920 census showed a total of 41,614,248 persons gainfully employed or a little less than 40 per cent of the total population. Of the total number of workers, 24,862,000, or about 60 per cent, were employed in the basic industries of agriculture, mining and manufacturing. The following tabulation gives the number of workers in each of the nine principal groups at the census of 1920:

Agriculture, forestry, and animal husbandry	10,953,158
Extraction of minerals	1,090,223
Manufactures and mechanical industries	12,818,524
Transportation	3,063,582
Trade	4,242,979
Public service (not elsewhere classified)	770,460
Professional service	2,143,889
Domestic and personal service	3,404,892
Clerical	3,126,541
Total	41,614,248

It is of some interest to present the geographic distribution of the number of workers in agriculture compared with the number in manufacturing and mining combined. These figures together with the value of the products of each group by geographic divisions are shown in Table VIII.

TABLE VIII—COMPARISON OF AGRICULTURE WITH MANUFACTURES AND PRODUCTION OF MINERALS ON BASIS OF NUMBER OF PERSONS ENGAGED AND VALUE OF PRODUCT, BY GEOGRAPHIC DIVISIONS: 1919

Geographic Division	Persons engaged in— Agriculture	Manufactures and production of minerals [a]	Value of agricultural products [b]	Value added by manufacture plus value of products of mineral industries [a]
United States	10,636,826	11,893,558	$20,933,487,000	$28,206,165,000
New England	221,162	1 543 095	463,106,000	3,249,884,000
Middle Atlantic	633,664	3,816,142	1,497,641,000	9,287,921,000
East North Central	1,586,291	3,091,676	4,323,955,000	7 596,274,000
West North Central	1,664,919	708,772	5,540,245,000	1,690,804,000
South Atlantic	2,114,586	1,073,132	2,509,661,000	2,211,625 000
East South Central	1,782,628	480,570	1,722,324,000	846,211,000
West South Central	1,781,389	413,863	2,702,169,000	1,220,595,000
Mountain	414,009	222,382	914,787 000	634,264,000
Pacific	438,178	543,926	1,259,599,000	1,168,587,000

[a] Including production of oil and gas.
[b] Total value of crops plus total value of live stock products and domestic animals sold or slaughtered on farms, includes some duplication representing value of crops consumed by live stock.

Agriculture. General statistics and other information in respect to agriculture in the United States are given in the article AGRICULTURE. For special discussions of the important crops see CORN, OATS, POTATOES, WHEAT, COTTON, etc. The following articles bear on agricultural activities: AGRICULTURAL EDUCATION, AGRICULTURAL EXPERIMENT STATIONS; AGRICULTURAL EXTENSION WORK, AGRICULTURAL CREDIT; AGRICULTURE, INTERNATIONAL INSTITUTE OF; AGRICULTURE, UNITED STATES DEPARTMENT OF, HORTICULTURE; BOTANY; DISEASES OF PLANTS, TRACTOR; RECLAMATION; DAIRYING; LIVE STOCK; FOOD AND NUTRITION; FERTILIZERS; SOIL; VETERINARY MEDICINE. The articles on individual States consider local agricultural matters in detail.

Mineral Production. It was natural that the War should serve as a stimulus to a greater mineral production and from 1914 to 1918 there was a continuous increase in the value of metallic and non-metallic minerals mined. Table IX shows the condition of the industry over the period 1913–23.

Table X presents a survey of the principal minerals, by production and value, for the years 1913, 1920 (the peak year of the period), 1922, and 1923.

The more important minerals mined in the United States are treated under the following separate heads: COAL; COKE; COPPER; GOLD; IRON AND STEEL; LEAD; PETROLEUM; SILVER. See also ALUMINIUM; ASPHALT; BAUXITE; CEMENT; GRAPHITE; GYPSUM; LIME; NATURAL GAS; PHOSPHATE ROCK; PLATINUM; QUICKSILVER; RADIUM; TALC AND SOAPSTONE; STONE; SULPHUR; TIN; ZINC. The articles on the individual States contain sections on mineral production.

MANUFACTURES

Twenty years ago the United States was known chiefly as an agricultural and raw material producing nation. The developments of the last two decades brought this country to the

TABLE IX—TOTAL VALUE OF MINERAL PRODUCTS OF THE UNITED STATES FROM 1913 TO 1923

Year	Metallic Value	Nonmetallic Value	Unspecified (metallic and nonmetallic)	Total Value
1913	878,869,000	1,554,298,000	378,000	2,433,545,000
1914	686,639,000	1,424,063,000	470,000	2,111,172,000
1915	991,730,000	1,400,484,000	2,430,000	2,394,644,000
1916	1,620,745,000	1,884,413,000	3,281,000	3,508,439,000
1917	2,086,234,000	2,900,462,000	5,800,000	4,992,496,000
1918	2,153,318,000	3,380,690,000	6,700,000	5,540,708,000
1919	1,359,744,000	3,232,626,000	3,400,000	4,595,770,000
1920	1,762,350,000	5,214,170,000	4,820,000	6,981,340,000
1921	654 130 000	3,481,890,000	2,650,000	4,138,670,000
1922	987,180,000	3,656,410,000	3,700,000	4,647,290,000
1923	1,498,200,000	4,515,800,000	4,000,000	6,018,000,000
Grand total	28,392,410,000	51,738,902,000	93,117,000	80,224,429,000

TABLE X—PRODUCTION AND VALUE OF PRINCIPAL MINERALS FOR 1913, 1922, 1923

EXPRESSED IN THOUSANDS

	1913		1920		1922		1923	
	Am't	Value	Am't	Value	Am't	Value	Am't	Value
Aluminium, pounds	72,379	$13,845		$41,375		$13,622		$28,305
Copper, pounds	1,224,484	189,795	1,209,061	224,467	950,285	128,289	1,434,999	210,945
Gold, fine ounces	4,299	88,884	2,476	51,186	2,363	48,849	2,502	51,734
Iron, pig, long tons	30,388	458,342	35,710	1,140,904	27,670	608,114	38,363	935,908
Lead, short tons	436	38,405	476	76,296	468	51,562	543	76,138
Silver, fine ounces	66 801	40,348	55,361	60 801	56,240	56,240	73,335	60,134
Zinc, short tons	337	37,772	450	72,907	353	40,273	508	69,134
Cement, barrels	92,949	93,001	97,079	195,589	118,590	208,464	137,183	259,631
Clay products		181,289		373,670		321,494		
Bituminous coal, short tons	478,523	565,307	568,666	2,129,913	422,268	1,274,820	545,400	1,636,200
Anthracite coal long tons	81,718	195,181	79,998	434,252	48,824	273,700	85,218	491,537
Lime, short tons	3,595	14,648	3,570	37,543	3,639	33,255	4,057	39,413
Natural gas		87,846		166,259		221,535		250,000
Petroleum, barrels	248,446	237 121	442,929	1,360,745	557,531	895,111	733,260	930 760
Salt, barrels	34,399	10,123		29 894		27,464		27,600
Stone		83,732		133,541		122,066		161,880
Sulphur, long tons	311	5,479	1,517	30,000	1,343	22,000	1,618	26,000
Total metallic		882,980		1 762,350		987,180		1,498,200
Total nonmetallic		1,562,324		5,184,240		3,656,410		4,515,800
Total mineral products		2,445,805		6,951,410		4,647,290		6,018,000

forefront as an industrial nation. If development continues in the future as it has in recent years it will not be long until Eastern United States will be one of the highly industrialized areas of the world. The growth of industrial activity is best brought out by the data from the census of manufactures which are available at varying intervals since 1850. These figures are summarized in Table XI.

TABLE XI—SUMMARY OF MANUFACTURING INDUSTRIES OF THE UNITED STATES, 1850–1921

Census year	No of establishments	No of wage earners—average	Wages paid	Cost of materials	Value of products	Value added by manufacturing
			Millions of dollars			
1850	123,025	957,059 [b]	237	555	1,019	464
1860	140,433	1,311,246 [b]	379	1,032	1,886	854
1879	254,852	2,732,595 [b]	948	3 397	5,370	1,973
1889	355 405	4,251,535	1,891	5,162	9,372	4,210
1899	207,514	4,712 763	2,008	6,576	11,407	4,831
1904	216,180	5,468,383	2,610	8,500	14,793	6,294
1909	268,491	6,615,046	3,427	12,143	20,672	8,529
1914	275,791	7,036,337	4,079	14,368	24,246	9,878
1919	290,105	9,096,372	10,534	37,376	62,418	25,042
1921 [a]	196,267	6,946,570	8,200	25,337	43,653	18,317

[a] The 1921 census of manufactures relates only to establishments having products valued at $5000 or more, whereas at previous censuses the corresponding limit was $500. It is estimated that establishments with products valued between $500 and $5000, while constituting about 21 per cent of the total number employed, only constituted six tenths of one per cent of total wage earners and had an output of only three-tenths of one per cent of the total value of products.

[b] Includes salaried officials, clerks, etc.

In 1850 the total value of products of the manufacturing industries of the United States was only $1,019,000,000. By 1899 these had increased to $11,407,000,000; by 1909 this latter value had been nearly doubled, and in 1919 they reached the enormous total of $62,418,000,000. A considerable portion of this latter figure, however, was due to higher prices per unit and not entirely to increased quantity of product. Some approximation to the increase in physical volume of production can be arrived at by reducing the figures for later years by the use of price index numbers. Table XII gives figures on cost of material used, value of products and value added by manufacture for each census of manufactures since 1899 (1) as stated by the Census and (2) estimated on the basis that prices in succeeding periods had remained at the same level as in 1899. These latter computations are based on the all commodity wholesale price index of the Bureau of Labor Statistics, United States Department of Labor The index given in the first column of the table is the same as that computed by the Bureau except that for convenience the base has been transferred from 1913 to 1899. It must be remembered that the Department of Labor index is based on many products which do not enter into manufacture and for many reasons can give only rough approximations when used in this way. However, the resulting figures do

stand in approximately the same relation to each other as the weighted physical volume of the products and serve to give some idea of the physical growth of the manufacturing industries independent of the effect of price changes.

that the natural growth of the industries was almost sufficient to offset the lower activity due to the period of depression from which industry was recovering in 1921.

Another measure which may be employed to

TABLE XII—COMPUTATION OF APPROXIMATE VALUE OF MATERIALS, PRODUCTS AND VALUE ADDED BY MANUFACTURE AT 1899 PRICES

Year	Price Index	Cost of Materials (Millions of Dollars) As Stated	Cost of Materials (Millions of Dollars) At 1899 Prices	Value of Products (Millions of Dollars) As Stated	Value of Products (Millions of Dollars) At 1899 Prices	Value added by Manufacture (Millions of Dollars) As Stated	Value added by Manufacture (Millions of Dollars) At 1899 Prices
1899	100	6,576	6,576	11,407	11,407	4,831	4,831
1904	115	8,500	7,319	14,793	12,863	6,294	5,473
1909	129	12,143	9,413	20,672	16,025	8,529	6,612
1914	131	14,368	10,968	24,246	18,508	9,878	7,541
1919	275	37,376	13,591	62,418	22,697	25,042	9,106
1921	196	25,337	12,927	43,653	22,271	18,317	9,363

It will be noted that the value of products as stated by the census rose from $20,672,000,000 in 1909 to the maximum of $62,418,000,000 in 1919, an increase for the decade of over 200 per cent. Based on 1899 prices, the values of these products for the same years were $16,025,000,000 and $22,697,000,000, or an increase of $6,672,000,000, or 41.6 per cent. In the preceding decade, 1899 to 1909, computed on the same basis, the value of products rose from $11,407,000,000 to $16,025,000,000, an increase of 40.5 per cent. Computed on this basis the relative increase in the physical output of the manufacturing industry of the United States was about the same during the last decade as during the preceding.

The census of 1921 is the first of the biennial censuses of manufactures authorized by Congress. This latter census relates only to establishments having products valued at $5000 or more, whereas at previous censuses the corresponding limit was $500. The Bureau of the Census states that although the establishments with products valued between $500 and $5000 constitute 21.6 per cent of the total number of establishments in 1919, they represented only six-tenths of one per cent of the total number of wage earners and only three-tenths of one per cent of the total value of products. Consequently, their omission has only a slight effect upon the completeness of the data. Bearing this in mind, it is of interest to note that the value of products in 1921 when computed

gauge the trend of the manufacturing industries independent of the price factor is the average number of wage earners employed as given in Table XIII. In this case, however, the increasing introduction of labor-saving machinery and the varying efficiency of labor are factors which affect the results, but which cannot be evaluated In the decade between 1899 and 1909 the number of wage earners increased 40.3 per cent and between 1909 and 1919 the increase was 37.5 per cent. These figures agree fairly well with those arrived at from values of product computed at a constant price if allowance is made for the above-mentioned factors. However, between 1919 and 1921 the average number of wage earners declined from 9,096,000 to 6,947,000, a decrease of nearly 24 per cent. It is improbable that this decline can be entirely ascribed to labor-saving machinery or greater efficiency of labor, although both factors have played a large part during the post-war reconstruction period. In all probability there was a greater decline in industrial output in these two years than that indicated by the value of product at constant prices, but it was probably not so great as that shown by the figures for the number of wage earners.

Manufacturing Industries by Groups. The census classifies all manufacturing industries in 14 general groups. These groups together with some of the principal figures for the censuses of 1909, 1919 and 1921 are shown in Table XIII.

TABLE XIII—SUMMARY OF MANUFACTURING INDUSTRIES BY GENERAL GROUPS

Group	Average Number of Wage Earners 1909	1919	1921	Cost of Materials 1909 (Millions)	1919 (Millions)	1921 (Millions)	Value of Products 1909 (Millions)	1919 (Millions)	1921 (Millions)
Food and kindred products	411,575	684,672	568,734	$3,188	$10,112	$5,938	$3,938	$12,439	$7,850
Textiles and their products	1,445,720	1,611,309	1,510,876	1,763	5,382	3,804	3,087	9,216	6,961
Iron and steel and their products	1,026,553	1,585,712	1,031,523	1,800	4,816	3,003	3,164	9,404	5,601
Lumber and its manufactures	911,593	839,008	675,069	718	1,360	1,189	1,588	3,070	2,430
Leather and its finished products	309,766	349,362	280,071	670	1,714	934	993	2,610	1,544
Paper and printing	415,990	509,875	467,072	451	1,307	1,331	1,179	3,013	3,149
Liquors and beverages	77,827	55,442	35,374	186	223	158	674	604	292
Chemicals and allied products	267 261	427,008	329,472	931	3,748	3,070	1,527	5,610	4,537
Stone, clay and glass products	342,827	298,659	250,812	184	409	421	532	1,086	1,019
Metals and metal products other than iron and steel	249,607	339,469	235,170	892	1,910	995	1,240	2,760	1,575
Tobacco manufactures	166,810	157,097	149,985	177	484	609	416	1,013	1,018
Vehicles for land transportation	202,719	495,939	281,350	307	2,498	1,576	562	4,059	2,509
Railroad repair shops	304,592	515,709	418,285	215	548	507	438	1,354	1,267
Miscellaneous industries	482,206	1,227,111	712,777	661	2,868	1,801	1,334	6,180	3,872

at 1899 prices is only slightly less than the 1919 figure on the same base. This is quite a different conclusion than would be drawn from the decline in value as stated by the census which showed a decrease of $18,765,000,000 in value of product for the two years. From the figures based on 1899 prices it seems probable

The most important group from the standpoint of value of products is that of foods and their products which increased from less than $4,000,000,000 in 1909 to $12,439,000,000 in 1919. The two groups, textiles and their products, and iron and steel and their products, are practically tied for second place, although in

1921 the former group was well in the lead. A marked increase has occurred in the group of chemicals and allied products which were valued at $1,527,000,000 in 1909 and at $5,610,000,000 in 1919. Vehicles for land transportation shows the development of the automobile industry. This group increased from $562,000,000 in 1909 to $4,059,000,000 in 1919, an increase for the 10 years of 622 per cent. The next largest relative increase for any group was in miscellaneous industries which expanded during the decade 1909 to 1919 from $1,334,000,000 to $6,180,000,000, an increase of 364 per cent. The only group to show a decrease for the decade was that of liquors and beverages.

Manufacturing Industries by States and Geographical Divisions. Table XIV summarizes the most important items from the three censuses of 1909, 1919 and 1921 by States and by the nine geographic divisions used by the census. The largest actual increase in the value of products for any geographic division during the decade 1909–19 was for the Middle Atlantic States, including New York, New Jersey, and Pennsylvania. The value of the products produced in this division increased $12,712,000,000 during the 10 years, or 178 per cent of the 1909 value. The East North Central States, including Ohio, Indiana, Illinois, Michigan and Wisconsin, ran a close second in actual increase. The value of products produced in this territory rose from $5,212,000,000 in 1909 to $17,737,000,000 in 1919, an increase of $12,525,000,000, or 240 per cent. The greatest relative increase for any division was in the Pacific States where the value of products rose from $844,000,000 in 1909 to $3,158,000,000 in 1919, representing an increase of 274 per cent. This was followed by the West South Central States with an increase for the same 10 years of 264 per cent.

TABLE XIV—SUMMARY OF MANUFACTURING INDUSTRIES BY GEOGRAPHICAL DIVISIONS AND STATES, 1909, 1919 AND 1921

	Number of Establishments			Number of Wage Earners (Thousands)			Value of Products (Millions)		
	1909	1919	1921	1909	1919	1921	1909	1919	1921
United States	268,491	290,105	196,267	6,615	9,096	6,947	$20,672	$62,418	$43,653
New England	25,351	25 528	19,057	1,101	1,351	1,072	2,670	7,183	4,903
Maine	3,546	2,995	1,761	80	89	76	176	457	340
New Hampshire	1,961	1,499	1,122	79	83	67	165	407	246
Vermont	1,958	1,790	1,102	34	33	26	68	168	114
Massachusetts	11,684	11,906	9,994	585	714	579	1,491	4,011	2 849
Rhode Island	1,951	2,466	1,759	114	140	113	280	747	517
Connecticut	4,251	4,872	3,320	211	293	211	490	1,392	836
Middle Atlantic	81,315	88,360	67,181	2,208	2,873	2,246	7,142	19,855	14,589
New York	44,935	49,330	38,107	1,004	1,228	1,000	3 369	8,867	6,974
New Jersey	8,817	11,057	8,784	326	509	382	1,146	3,672	2,556
Pennsylvania	27,563	27,973	20,290	878	1,136	864	2,627	7,316	5,059
East North Central	60,013	61,332	43,549	1,514	2,397	1,711	5,212	17,737	11,805
Ohio	15,138	16,125	11,479	447	731	494	1,438	5,100	3,301
Indiana	7,969	7,916	5,109	187	278	207	579	1,899	1,378
Illinois	18,026	18,593	13,952	466	653	514	1,919	5,425	3,705
Michigan	9,159	8,305	5,718	231	471	304	685	3,466	2,206
Wisconsin	9,721	10.393	7,291	183	264	192	590	1,847	1,215
West North Central	27,171	29,166	17,336	374	500	385	1,804	5,187	3,507
Minnesota	5,561	6,225	4,089	85	116	86	409	1,218	850
Iowa	5,528	5,683	3,527	62	81	62	259	745	521
Missouri	8,375	8,592	5,442	153	195	156	574	1,594	1,162
North Dakota	752	894	388	3	4	3	19	57	36
South Dakota	1,020	1,414	574	4	6	5	18	62	42
Nebraska	2,500	2,884	1,390	24	37	28	199	596	334
Kansas	3,435	3,474	1,926	44	61	45	325	914	561
South Atlantic	28,088	29,976	16,436	663	817	646	1,381	4,455	2,985
Delaware	726	668	460	21	29	18	53	165	87
Maryland	4,837	4,937	3,128	108	140	107	316	874	638
District of Columbia	518	595	490	8	10	9	25	69	68
Virginia	5,685	5,603	2,570	106	119	89	220	644	454
West Virginia	2,586	2,785	1,550	64	83	61	162	472	310
North Carolina	4,931	5,999	2,602	121	158	136	217	944	665
South Carolina	1,854	2,004	1,107	73	79	76	113	381	236
Georgia	4,792	4,803	2,809	105	123	98	203	693	381
Florida	2,159	2,582	1,720	57	74	53	73	213	146
East South Central	15,381	14,655	7,254	262	329	259	630	1,642	1,094
Kentucky	4,776	3,957	2,038	65	69	59	224	396	303
Tennessee	4,609	4,589	2,245	74	95	75	180	536	374
Alabama	3,398	3,654	1,855	72	107	83	146	493	303
Mississippi	2,598	2,455	1,116	50	58	42	80	198	114
West South Central	12,339	13,909	8,104	205	285	230	625	2,278	1,724
Arkansas	2,925	3,123	1,289	45	50	33	75	200	119
Louisiana	2,516	2,617	1,851	76	98	85	224	676	479
Oklahoma	2,310	2,445	1,398	13	30	22	54	401	284
Texas	4,588	5,724	3,566	70	108	89	273	1,000	842
Mountain	5,254	7,612	4,016	75	109	82	364	923	617
Montana	677	1,290	571	12	17	11	73	167	81
Idaho	725	922	485	8	14	11	22	81	57
Wyoming	268	576	254	3	7	7	6	81	80
Colorado	2,034	2,631	1,491	28	35	28	130	276	221
New Mexico	313	387	194	4	6	4	8	18	14
Arizona	311	480	269	6	9	5	50	121	39
Utah	749	1,166	645	12	19	13	62	157	111
Nevada	177	166	107	2	3	2	12	23	13
Pacific	16,579	19,567	13,334	213	435	316	844	3,158	2,431
Washington	3,674	4,918	2 908	69	133	78	221	810	448
Oregon	2,246	2,707	1,730	29	59	40	93	367	224
California	7,659	11,942	8,696	115	244	198	530	1,981	1,759

The three geographical divisions, New England, Middle Atlantic and East North Central, contain the principal manufacturing industries. This territory, which may be described roughly as east of the Mississippi and north of the Ohio and the Mason and Dixon line, produced 72.7

per cent of the value of all manufactured products in 1909, 71.8 per cent in 1919, and 71 7 per cent in 1921. See also articles MOTOR VEHICLES; FOOD AND NUTRITION; IRON AND STEEL; BOOTS AND SHOES; LEATHER; RUBBER; SILK; SILK, ARTIFICIAL; TEXTILE MANUFACTURING; WATER POWER; PAPER AND WOOD PULP; SHIPPING; SHIPBUILDING; MOVING PICTURES; RADIO; and the section *Manufactures* under the articles on the individual States.

FOREIGN COMMERCE

The War had a marked effect upon the foreign trade of the United States. For the five pre-war years, 1910 to 1914 inclusive, the average exports of domestic merchandise amounted to $2,130,000,000 per year while imports averaged $1,689,000,000. During the next five years, 1915 to 1920, domestic exports averaged $6,161,000,000 and imports amounted to $3,223,000,000. The foreign trade of this country reached its maximum in 1920 when domestic exports totaled $8,080,000,000 and imports $5.278,000,000 After that the value of the foreign trade declined, amounting to $3,765,000.000 for exports and $3,113,000,000 for imports in 1922 and in 1923 to $4,091,000,000 and $3,792,000,000 respectively.

The record of foreign trade in value, although of prime significance, as a measure of its economic importance, is not entirely satisfactory. Value is the product of two variables—quantity and price. During a period of rapidly changing price levels it is difficult to know whether the major portion of changes in total value are due to this factor alone or whether the physical volume of trade has also changed. Various methods have been employed to measure the relative physical volume of foreign trade but probably the most satisfactory is to compute the value of the quantities of commodities exported or imported each year using a constant price. The Federal Reserve Board computes a monthly index of foreign trade on this basis using only the more important commodities. The Department of Commerce computed the value of the foreign trade of the United States for a series of years based on 1923 prices. These data are summarized in Table XVI. This table shows that while the value of domestic exports in 1920 as stated was 379 per cent of the five-year pre-war average, the physical volume of these exports was only 142 per cent of the pre-war value, or an increase in actual quantity of 42 per cent In 1923, domestic exports were 92 per cent greater in actual value than the pre-war average but in value at 1923 prices or physical volume they were only 10 per cent greater.

Imports in 1923, on the other hand, while they

TABLE XV—EXPORTS, IMPORTS AND BALANCE OF TRADE OF THE UNITED STATES

(Values in millions of dollars)

Years	Merchandise exports			Merchandise imports				Excess of exports (+) or imports (−)		
	Domestic	Foreign	Total	Free	Dutiable	Total	Per cent free	Per cent imports are of exports	Merchandise	Gold and silver	Merchandise, gold, and silver
Years ended June 30—											
1875–1879	599	14	612	142	323	466	30 6	76 0	+147	+27	+174
1880–1884	794	17	811	208	477	685	30.3	84.5	+125	-25	+100
1885–1889	702	13	715	228	447	675	33 8	94.4	+40	+13	+53
1890–1894	887	16	902	383	414	797	48.1	88.3	+106	+50	+156
1895–1899	1,021	19	1,040	341	377	718	47 5	69.0	+322	+10	+332
1900–1904	1,403	26	1,429	397	522	919	43 2	64.3	+510	+17	+527
1905–1909	1,707	26	1,733	567	690	1,257	45.1	72.5	+476	−6	+471
1910–1914	2,130	35	2,166	906	783	1,689	53 6	78.0	+477	+38	+515
Years ended, Dec 31—											
1915–1920	6.161	101	6,261	2,160	1,063	3,223	67.0	51.5	+3,039	−85	+2,953
1921–1923	4,078	83	4,162	1,857	1,281	3,138	59.2	75.4	+1,024	−407	+617
Years ended June 30—											
1910	1,710	35	1,745	755	802	1,557	48.5	89.2	+188	+85	+273
1911	2,014	36	2,049	777	750	1,527	50 9	74 5	+522	−32	+490
1912	2,170	34	2,204	882	772	1,653	53 3	75 0	+551	+26	+577
1913	2,429	37	2,466	988	825	1,813	54.5	73 5	+653	+39	+692
1914	2,330	35	2,365	1,128	766	1,894	59 5	80 1	+471	+70	+541
Years ended, Dec. 31—											
1915	3,493	61	3,555	1,167	611	1,779	65.6	50.0	+1,776	-401	+1,375
1916	5,423	60	5,483	1,612	780	2,392	67.4	43.6	+3,091	−492	+2,599
1917	6,170	64	6,234	2,136	817	2,952	72.3	47 4	+3,281	−150	−3,131
1918	6,048	101	6,149	2,230	801	3,031	73 6	49.3	+3,118	+160	+3,278
1919	7,750	171	7,920	2,699	1,206	3,904	69.1	49 3	+4,016	+441	+4 457
1920	8,080	148	8,228	3,117	2,161	5,278	59.1	64.2	+2,950	−69	+2,880
1921	4,379	106	4,485	1,562	947	2,509	62 3	55.9	+1,976	−679	+1,297
1922	3,765	67	3,832	1,872	1,241	3 113	60 1	81 2	+719	−246	+473
1923	4,091	77	4,168	2,136	1,656	3,792	56 3	91 0	+376	−296	+80

TABLE XVI—VALUE OF FOREIGN TRADE AS STATED AND AT 1923 PRICES

Year	DOMESTIC EXPORTS				IMPORTS			
	Value as stated		Value at 1923 prices		Value as stated		Value at 1923 prices	
	Millions of dollars	Index numbers	Millions of dollars	Index numbers	Millions of dollars	Index numbers	Millions of dollars	Index numbers
1910–14	2,130	100	3 729	100	1,689	100	2,452	100
1920	8,080	380	5,290	142	5,278	313	3,348	137
1921	4,379	207	4,513	121	2,509	149	2,897	118
1922	3,765	177	4,159	112	3,113	184	3.667	150
1923	4,091	192	4,091	110	3,792	225	3,792	155

were 125 per cent greater than the pre-war average in value as stated, were 55 per cent greater in physical volume.

Thus, although both exports and imports were larger in the latter years of the decade than they were before the War, imports expanded much more than exports both in value as stated and in volume. This change in the trend of our trade towards a closer balance between exports and imports was largely the natural result of the War and its accompanying developments. The great expansion of our industries required larger supplies of raw material, much of which, like silk and rubber, must be imported. Our higher standards of living and the growth of our population required more of our products for home consumption while the increasing competition of newly developed countries like Canada and Argentina tended to decrease our exports of crude materials and foodstuffs.

Furthermore, the shift of the United States from a debtor to a creditor nation rendered a large favorable balance in merchandise trade less necessary as well as less desirable.

On the other hand, there was a steady increase in the exports of manufactured products, as is evident from the data in Table XVII. Before the War crude materials formed approximately one-third of both exports and imports while manufactured goods ready for consumption formed 31 per cent of exports and 23 per cent of imports. In 1923, manufactures ready for consumption formed over 36 per cent of the total exports and crude materials only 29.4 per cent. In imports the opposite tendency was found, with crude materials becoming more important than formerly.

Before 1914, only two of the six Grand Divisions were important purchasers of products from the United States. These were Europe and North America, which together in the five pre-war years 1910–14 averaged to take 85.5 per cent of all exported goods. Europe alone took 62.3 per cent; North America 23.2 per cent, while 5.6 per cent went to each of South America and Asia, 2.2 per cent to Oceania and 1.1 per cent to Africa. The significant change after the War was the increased proportion going to Asia, which in 1923 took 12.3 per cent of all exports. The proportion going to North and South America also increased, amounting to 26.1 and 6.5 per cent respectively in 1923. In the same year Oceania received 3.5 per cent and Africa 1.5 per cent, while Europe took only 50.2 per cent. This was the lowest proportion of our exports ever sent to Europe in any year for which records are available.

In the case of our import trade approximately 50 per cent was received from Europe before the War. In 1918, the proportion coming from that Grand Division fell as low as 14 per cent but later it increased, amounting to 31.8 per cent in 1922 and 30.5 per cent in 1923.

TABLE XVII—FOREIGN TRADE OF THE UNITED STATES BY COMMODITY GROUPS*

EXPORTS OF DOMESTIC MERCHANDISE

(Values in millions of dollars)

Year	Crude material for use in manufacturing		Foodstuffs in crude condition and food animals		Foodstuffs partly or wholly manufactured		Manufactures for use in further manufactures		Manufactures ready for consumption	
	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total
1910	566	33 1	110	6.4	259	15.2	268	15 7	499	29.2
1911	713	35 4	103	5 1	282	14.0	309	15.4	598	29 7
1912	723	33.3	100	4 6	319	14 7	348	16 0	672	31.0
1913	732	30 1	182	7.5	321	13 2	409	16 8	776	32.0
1914	793	34.0	137	5.9	293	12 6	374	16.1	725	31.1
Average 1910–1914	705	33.1	127	5 9	295	13.8	342	16 0	654	30 7
1915	510	18 8	507	18.7	455	16.7	356	13 1	807	29 7
1916	536	12 6	381	8 9	599	14.0	658	15.4	1,998	46.8
1917	732	11.8	532	8 5	738	11 9	1,191	19 1	2,943	47 3
1918	897	15 4	375	6.4	1,154	19.8	1,201	20 6	2,185	37.4
1919	1,610	20 8	678	8 8	1,963	25 3	922	11.9	2,563	33.1
1920	1,871	23 2	918	11.4	1,117	13.8	958	11 9	3,205	39.7
1921	984	22 5	692	15 8	670	15.3	399	9 1	1,626	37.1
1922	981	26 1	459	12 2	588	15.6	438	11 6	1,292	34.3
1923	1,202	29 4	257	6 3	583	14.3	564	13 8	1,478	36 1

* The sixth group of miscellaneous commodities is not given but it usually comprises less than one per cent of the total

TOTAL IMPORTS

(Values in millions of dollars)

Year	Crude material for use in manufacturing		Foodstuffs in crude condition and food animals		Foodstuffs partly or wholly manufactured		Manufactures for use in further manufactures		Manufactures ready for consumption	
	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total
1910	566	36.4	145	9 3	182	11 7	285	18.3	368	23 6
1911	511	33.5	181	11 8	172	11 3	288	18.8	361	23.7
1912	556	33 6	230	13 9	196	11.9	294	17.8	360	21.8
1913	635	35 0	212	11.7	194	10 7	349	19.3	408	22.5
1914	633	33.4	248	13.1	228	12.0	319	16.9	449	23 7
Average 1910–14	580	34.4	203	12 0	194	11.5	307	18.2	389	23.1
1915	575	34 4	224	13.4	286	17.1	237	14.2	336	20.0
1916	949	43.2	252	11.5	311	14.1	357	16.2	312	14 2
1917	1,110	41.7	336	12 6	343	12.9	478	18.0	377	14.2
1918	1,230	41.8	373	12.7	380	12.9	541	18 4	403	13.7
1919	1,674	42.9	545	14.0	556	14.2	610	15.6	493	12.7
1920	1,752	33.2	578	10 9	1,238	23.5	803	15.2	877	16 6
1921	853	34 0	304	12.1	369	14.7	344	13.7	619	24.7
1922	1,161	37.3	330	10.6	387	12.4	553	17.8	663	21.3
1923	1,389	36.6	363	9.6	530	14 0	719	19.0	770	20.3

The proportion of imports from North American countries increased from an average of 20.6 per cent for the five pre-war years to 26.4 per cent in 1923, while those from Asia amounted to 15.3 and 26.9 per cent for the same periods. Small increases occurred in the proportion of imports from the other three Grand Divisions.

smaller in the later years of the decade, the rise in price was sufficient to make the total value much greater than before the War. Refined mineral oils ranked second, while automobiles and parts ranked third in 1923 although before the War they were of very much smaller relative importance. Coal, tobacco,

TABLE XVIII—FOREIGN TRADE OF THE UNITED STATES BY GRAND DIVISIONS

Values in Millions of Dollars

Grand Division	Total Exports						Total Imports					
	1910–1914		1922		1923		1910–1914		1922		1923	
	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total
Europe	1,350	62 3	2,083	54.4	2,093	50.2	836	49.5	991	31.8	1,157	30.5
North America	501	23.1	916	23.9	1,087	26.1	347	20.6	822	26.4	1,002	26.4
South America	121	5 6	226	5 9	269	6.5	207	12.2	359	11.5	467	12.3
Asia	121	5.6	449	11.7	511	12.3	259	15.3	827	26 6	1,020	26.9
Oceania	48	2 2	102	2 7	147	3 5	17	1.0	49	1 6	59	1.6
Africa	25	1 1	56	1.5	61	1 5	23	1 3	65	2.1	87	2.3
Total	2,166	100 0	3,832	100 0	4,168	100 0	1,689	100.0	3,113	100.0	3,792	100.0

The individual countries of most importance in the foreign trade of the United States are shown in Table IX. The five countries which have been the most important purchasers of goods from this country are the United Kingdom, Canada, Germany, France, and Japan. The United Kingdom averaged to take 26.2 per cent of our total exports before the War and 21.2 per cent in 1923. Canada took 14 5 and 15.6 per cent in the same two periods, while the

pork products, wheat and flour, copper, and lumber were among the other important exports.

Table XXI shows a few of the most important commodities imported into the United States. Of these, silk and sugar are in the first rank, with coffee, rubber, wool, hides and skins, and pepper of next importance. Each of these commodities shows a large increase both in volume and value in the post-war years compared with pre-war. The largest increases in the actual

TABLE XIX—LEADING COUNTRIES IN THE FOREIGN TRADE OF THE UNITED STATES

Values in Millions of Dollars

Country	Total Exports						Total Imports					
	1910–1914		1922		1923		1910–1914		1922		1923	
	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total	Value	Per cent of total
United Kingdom	568	26.2	856	22.3	882	21.2	279	16 5	357	11 5	404	10 7
France	139	6.4	267	7 0	272	6.5	130	7 7	113	4 6	150	3 9
Belgium	53	2.5	102	2.6	101	2 4	40	2 4	54	1 7	68	1 8
Netherlands	105	4 8	118	3.1	109	2 6	35	2 1	64	2 0	78	2 0
Germany	304	14.0	316	8.2	317	7 6	176	10 4	117	3 8	161	4 3
Scandinavia	33	1.5	100	2 6	109	2 6	20	1 2	53	1 7	63	1.7
Spain	26	1 2	71	1 9	62	1.5	22	1 3	29	9	31	8
Italy	66	3.0	151	3.9	168	4.0	51	3.0	64	2 1	92	2.4
Balkan Countries	5	.2	30	.8	18	.4	14	8	35	1 1	23	.6
Egypt	2	.1	8	.2	6	.1	17	1 0	35	1 1	39	1.0
Argentina	47	2.2	96	2.5	113	2.7	33	1.9	86	2 8	115	3.0
Brazil	31	1 5	43	1 1	46	1.1	111	6 6	120	3.9	143	3.8
Chile	14	.6	22	.6	31	.7	23	1 4	60	1 9	92	2 4
Cuba	63	2.9	128	3.3	192	4.6	122	7.2	268	8 6	376	9.9
Mexico	53	2 5	110	2 9	121	2.8	70	4 2	132	4 2	140	3 7
Canada	315	14 5	577	14.1	652	15 6	117	6 9	364	11 7	416	11 0
China	31	1 4	127	3.3	135	3 2	38	2 3	152	4 9	212	5 6
Japan and Chosen	45	2.1	222	5.8	267	6.4	85	5 0	354	11 4	347	9.2
British East Indies	14	.7	37	1.0	40	.9	91	5.4	205	6.6	310	8 2
Australia	39	1.8	81	2.1	120	2 9	12	.7	36	1.1	41	1 1
Total of 20 countries	1,953	90 2	3,460	90 3	3,758	90 2	1,488	88 1	2,727	87 6	3,302	87 1

trade with Germany declined from 14 per cent pre-war to 7.6 per cent in 1923. Japanese trade increased from 2.1 per cent before the War to 6.4 per cent in 1923 while France took approximately 6.5 per cent of the total in each period.

In the case of imports, Canada, the United Kingdom, Japan, Cuba, and the British East Indies were of most importance. The proportion from the United Kingdom declined compared with pre-war, while that from each of the other countries mentioned increased. Germany, which before the War furnished 10.4 per cent of the total imports, sent only 4.3 per cent in 1923.

As shown in Table XX unmanufactured cotton is by far the most important single commodity exported from the United States. Although in actual quantity export was much

quantity imported occurred in paper, rubber, and silk See also the articles SHIPPING; SHIPBUILDING; PANAMA CANAL.

RAILWAYS

The total railway mileage in operation in the United States in 1922, according to preliminary reports of the Interstate Commerce Commission, was 262,828 miles. This represents a net gain of only 4795 miles over the figure 10 years previous (1912), and represents an actual loss in operated mileage compared with the peak year of 1917 when 266,059 miles were reported in operation. The era of railroad building in the United States may be said to have started in 1850. At that time there were only 9021 miles

TABLE XX—FIFTEEN PRINCIPAL COMMODITIES EXPORTED FROM THE UNITED STATES
Value in Thousands of Dollars

Commodities	1910–1914 Average	1922	1923
Cotton, unmanufactured	551,890	673,250	807,092
Mineral oils, refined	110,514	312,563	326,599
Automobiles and parts	23,362	98,069	166,343
Coal	52 638	91,243	154,124
Tobacco leaf	44,686	145,985	152,303
Lard, including neutral	56,895	94,071	133,333
Wheat	55,063	206,338	116,490
Copper, refined		89,030	110 489
Wheat flour	51,127	85,483	88,151
Boards, planks, and scantlings	50,686	57,415	81,057
Cotton cloth	27,052	85,232	79,313
Fruits	27,626	74,359	67,451
Bacon	23,205	51,989	60,084
Hams and shoulders, cured	21,788	57,070	59 319
Iron and steel, plates, sheets, etc	22,674	45,760	58,613

TABLE XXI—TEN PRINCIPAL COMMODITIES IMPORTED INTO THE UNITED STATES
Value in Thousands of Dollars

Commodity	1910–1914 Average	1922	1923
Silk, raw, in skeins, etc.	77,058	365,787	391,942
Sugar (cane)	103,517	251,905	380,180
Coffee	101,455	160,854	189,993
India rubber, crude	86,345	101,843	185,068
Wool, unmanufactured, including mohair	39,259	86,546	129,711
Hides and skins (except fur)	104,582	107,039	118 918
Paper, newsprint	4,804	72,314	98,021
Furs, undressed	14,767	62,495	79,642
Wood pulp	14,631	63,292	74,701
Burlaps, jute	29,421	49,256	66 971

of railroad in operation in the United States. By 1860 this had increased to 30,626 miles, a growth for the decade of 21,605 miles, or nearly 140 per cent During the next decade economic development was checked somewhat by the intervention of the Civil War, but in spite of that, 21,296 miles or practically the same growth as in the preceding decade, was added to the country's railroads Between 1870 and 1880 over 40,000 miles were built and between 1880 and 1890 nearly 74,000 miles For the next decade building slackened somewhat, the increase amounting to only 31,773 miles, but between 1900 and 1910 the mileage was increased by 51,028 miles However, from 1910 to 1920 there was a net increase in operated mileage of only 13,829. Even in the early years of the decade the growth was at the rate of between 3000 and 4000 miles per year, or considerably smaller than the rate in the preceding decade. With the beginning of the War in 1914, railroad building in the United States declined greatly and after 1917 the number of miles in actual operation decreased each year. This growth and decline is summarized in Table XXII.

TABLE XXII—RAILROAD MILEAGE OPERATED IN THE UNITED STATES[a] 1850 TO 1922

Year	Miles of line in operation	Increase per decade Miles
1850	9,021	6,203
1860	30,626	21 605
1870	52,922	21,296
1880	93,262	40,340
1890	167,191	73,926
1900	198 964	31,773
1910	249,992	51,028
1915	264 378	
1916	266,381	
1917	266,059	
1918	264 233	
1919	263,707	
1920	263,821	13,829
1921	262,544	
1922	262,828[b]	

[a] Excludes mileage of switching and terminal companies but includes some duplication of mileage operated under trackage rights.
[b] Preliminary.

Table XXIII gives total miles of railroads in the United States by states for 1900, 1910, and 1920 as reported by the Interstate Commerce Commission.

TABLE XXIII—RAILROAD MILEAGE IN THE UNITED STATES BY STATES

	1900	1910	1920
New England States	7,521	7,921	7,942
Maine	1,915	2,248	2,295
New Hampshire	1,239	1,246	1,252
Vermont	1,012	1,100	1,077
Massachusetts	2,119	2,115	2,106
Rhode Island	212	212	211
Connecticut	1,024	1,000	1,001
Middle Atlantic	20,708	21,980	22,293
New York	8,121	8,430	8,390
New Jersey	2,257	2,260	2,352
Pennsylvania	10,330	11,290	11,551
East North Central	41,006	44,928	44,904
Ohio	8,807	9,134	9,002
Indiana	6,471	7,420	7,426
Illinois	11,003	11,878	12,188
Michigan	8 195	9,021	8 734
Wisconsin	6,531	7,475	7,554
West North Central	42,988	49,730	52,180
Minnesota	6,943	8,669	9,114
Iowa	9,185	9,755	9,808
Missouri	6,875	8,083	8,117
North Dakota	2,731	4,201	5,311
South Dakota	2,850	3,948	4,276
Nebraska	5,685	6,067	6,166
Kansas	8 719	9 007	9,388
South Atlantic	23,362	29,796	32,380
Delaware	347	335	335
Maryland	1,376	1,426	1,436
District of Columbia	32	36	36
Virginia	3 779	4,535	4,703
West Virginia	2,228	3,601	3,996
North Carolina	3 831	4,932	5 522
South Carolina	2,818	3,442	3 814
Georgia	5,652	7,056	7,326
Florida	3 299	4,432	5,212
East South Central	13,343	17,074	17,754
Kentucky	3,060	3,526	3,929
Tennessee	3,137	3,816	4,078
Alabama	4,226	5,226	5,378
Mississippi	2,920	4,506	4 369
West South Central	16,898	31,122	32,972
Arkansas	3 360	5,306	5,052
Louisiana	2,824	5,554	5,223
Oklahoma	828	5,980	6,572
Texas	9,886	14,282	16,125
Mountain	17,130	22,956	25,170
Montana	3,010	4,207	5 072
Idaho	1,261	2,179	2,877
Wyoming	1,229	1,645	1,931
Colorado	4,587	5,533	5,519
New Mexico	3,075	3,032	2,972
Arizona	1,512	2,097	2,478
Utah	1,547	1,986	2 161
Nevada	909	2,277	2,160
Pacific	10,389	14,932	17,248
Washington	2,914	4,875	5,587
Oregon	1,724	2,285	3,305
California	5,751	7,772	8,356
Total	193,345	240,439	252,815

Railroad Traffic. Coincident with the growth in mileage there was a large increase in traffic. Between 1890 and 1920, the operated mileage increased 96,630 miles, or 57 per cent, while the number of passengers carried rose from 492,000,000 to 1,235,000,000, an increase of over 150 per cent. The equivalent number of passengers carried one mile increased nearly 300 per cent The tons of freight carried rose from 632,000,000 in 1890 to 2,260,000,000 in 1920, or more than 250 per cent, while the equivalent tons of freight carried one mile increased 432 per cent.

During the decade 1910–20, there was a significant increase in the traffic handled by the roads without a corresponding growth in mileage. In 1920 the number of passengers carried was 263,000,000 more than in 1910 and the equivalent number carried one mile increased 45 per cent over the 1910 figure. The increase in freight traffic during this decade was even

larger, amounting to over 60 per cent in the equivalent tons carried one mile.

The increase in efficiency is shown by the fact that between 1910 and 1920 the average tons of freight per train increased from 380 to 647 while the average number of passengers per train rose from 56 to 80.

31, 1922, only 64,139. In tractive power the average locomotive had increased from 27,282 pounds in 1910 to 36,365 pounds in 1920. In total tractive power, therefore, the locomotive equipment in 1920 showed a gain of over 50 per cent compared with 1910.

During the same decade the number of pas-

TABLE XXIV—RAILROAD TRAFFIC

Item	1890	1900	1910	1920
Number passengers carried	492,430,865	576,831,251	971,683,199	1,234,862,048
Number passengers carried one mile	11,847,785,617	16,038,076,200	32,338,496,299	46,848,667,987
Mileage of revenue passenger trains	285,575,804	363,469,596	549,015,003	561,633,392
Average passengers per train	41	41	56	80
Average journey per passenger	24 06	27.80	33 50	37.91
Tons of freight carried	631,740,636	1,081,983,301	1,849,900,101	2,259,983,278
Tons of freight carried one mile	77,207,047,298	141,596,551,161	255,016,910,451	410,306,209,802
Mileage revenues freight trains	435,170,812	492,543,526	635,450,681	607,508,141
Average tons per train	177.42	270.86	380.38	646 87

The change in the character of the freight traffic handled by the roads between 1910 and 1922 is indicated by the figures in Table XXV, which summarizes the freight movement by the principal groups of commodities. The most significant change is the increase in the quantity of the products of agriculture handled. For total freight carried this group increased from 160,402,000 tons in 1910 to 220,250,000 tons in 1920 and 221,847,000 tons in 1922. The tonnage

senger train cars increased from 47,179 to 56,102, but total freight cars increased from 2,133,531 in 1910 to only 2,322,025 in 1920. This latter figure shows a decline from the number during the War. Table XXVI shows the number and capacity of freight cars by classes in 1910, 1915, and 1920. It will be noted that the number of flat cars decreased very greatly while there were large relative increases in tank and refrigerator cars.

TABLE XXV—SUMMARY OF FREIGHT TRAFFIC MOVEMENT ON RAILROADS BY PRINCIPAL GROUPS OF COMMODITIES

Commodity group	Thousands of Tons Originating on Road 1910	1915	1918	1920	1922
Products of agriculture	78,737	113,040	116,051	110,840	111,783
Animals and products	20,294	26,660	35,777	26,595	26,235
Products of mines	544,604	556,582	734,796	712,154	532,399
Products of forests	113,011	93,971	97,256	100,766	89,071
Manufactured and miscellaneous	175,397	163,988	226,077	251,864	220,445
Merchandise L. C. L.	36,421	48,163	53,387	53,202	43,177
Total	968,464	1,002,404	1,263,344	1,255,420	1,023,110

Commodity group	Total Freight Carried 1910	1915	1918	1920	1922
Products of agriculture	160,402	221,916	228,322	220,050	221,847
Animals and products	38,625	45,254	61,405	44,854	45,090
Products of mines	942,066	951,041	1,263,503	1,209,098	922,403
Products of forests	193,240	171,735	192,617	190,580	172,929
Manufactured and miscellaneous	339,392	326,092	463 011	494,556	426,288
Merchandise L. C L.	71,601	81,275	98,368	89,901	70,927
Total	1,745,325	1,797,312	2,307,226	2,254,038	1,859,484

of minerals increased during the War and up to 1920 but in 1922 was but little above the 1910 figure. Forest products showed a tendency to decline, being less in both 1920 and 1922 than in 1910.

Finances. As a result of the demand made upon the roads during the War, including operation under government management and the difficulties experienced in the reconstruction period, the railroads of the United

TABLE XXVI—RAILROAD FREIGHT CARS

Number and Capacity by Classes

Class of car	1910 Number	1910 Average capacity Tons	1915 Number	1915 Average capacity Tons	1920 Number	1920 Average capacity Tons
Box	966,577	33	1,041,692	35.5	1,049,262	37.3
Flat	153,918	33	146,336	36.0	104,987	39 2
Stock	77,584	30	86,326	32.0	80,774	33 8
Coal	818,689	41	910,637	45.9	933,129	49 4
Tank	7,434	39	10,164	39.0	10,380	46.3
Refrigerator	30,918	30	52,446	32.1	59,677	31 8
Other	78,411	37	93,955	42.2	83,816	46.2
Total	2,133,531	36	2,341,556	39.7	2,322,025	42.4

Equipment. In the matter of equipment the railroads showed comparatively small increases during the decade 1910–20. In 1910 the total number of locomotives in service on the steam roads were 60,019 while at the end of 1920 the number was 68,942, and on Dec.

States suffered financially during the past decade. As shown in Table XXVII, the total railroad capital outstanding, including stocks and bonds, amounted to $18,417,000,000 in 1910 By 1915 this had increased to $21,128,000,000, a gain of $2,711,000,000. During the next five

years the gain was only $663,000,000, entirely in the form of preferred stocks and bonds. In 1910, the total dividend and interest payments amounted to $805,000,000, but in 1920 less than $759,000,000 was paid out for these purposes.

TABLE XXVII—RAILROAD CAPITAL
Thousands of Dollars

	1910	1915	1920
Stock:			
Common	6,710,169	7,599,938	7,215,862
Preferred	1,403,489	1,394,957	1,897,824
Total	8,113,657	8,994,895	9,113,685
Funded Debt.			
Bonds	7,408,183	9,047,183	10,819,714
Other	2,895,291	3,085,882	1 958 052
Total	10,303,475	12,133,064	12,777,766
Total Railroad Capital	18,417,132	21,127,959	21,891,451
Amount paid in dividends	405,771	328,478	331,103
Interest on funded debt	399,582	464,186	427,825
Total dividends and interest	805,353	792,664	758,928

Table XXVIII gives the principal items in the financial statements of the railroads considered as a whole for the years 1910, 1915, 1920, and preliminary figures for 1923, based upon data published by the Interstate Commerce Commission.

TABLE XXVIII—RAILROAD FINANCES
SUMMARY OF REPORTS OF CLASS 1 ROADS, I. E. ROADS WITH ANNUAL OPERATING REVENUES ABOVE $1,000,000
Millions of dollars

Item	1910	1915	1920	1923
Revenue				
Freight	1,926	2,038	4,324	4,624
Passenger	629	646	1,287	1,148
Other	196	226	614	573
Total operating	2,751	2,910	6,225	6,345
Expense:				
Maintenance of way	369	382	1,031	.....
Equipment	413	510	1,593	
Transportation	916	1,032	2,902	
Other	125	140	304	
Total operating	1,823	2,064	5,830	4,943
Net operating revenue	928	846	395	1,402
Net income	379	355	58	978

The largest single item of expense in the railroad budget was that for wages. In 1910, the average number of employees on the railroads was 1,699,000 with an annual payroll of $1,144,000,000, or an average of $673 per employee. In 1920, the number of employees was nearly 20 per cent larger while the payroll had increased more than 200 per cent, giving an average annual compensation per employee of $1820. After that, with the railroads under private management, there was some decrease, so that in 1922 the average number of employees was slightly less than in 1910 but the pay roll was still 133 per cent larger and the average annual salary was $1622.

TABLE XXIX—RAILROAD EMPLOYEES· AVERAGE NUMBER AND COMPENSATION

Year	Average number of employees	Total annual compensation	Average compensation per employee
1900	1,017,653	$ 577,264,841	$ 567
1910	1,699,420	1,143,725,306	673
1915	1,491,849	1,236,305,445	829
1918	1,841,575	2,613,813,351	1,419
1919	1,913,422	2,843,128,432	1,486
1920	2,022,832	3,681,801,193	1,820
1921	1,660,617	2,765,236,353	1,665
1922	1,645,244	2,669,180,772	1,622

Taxes and assessments paid by the railroads also increased greatly in the 10 years. In 1910, the total taxes and assessments amounted to $108,304,947 and by 1920 these had risen to $282,750,533, an increase of over 160 per cent.

To compensate for these and other increased expenses, there were adjustments in the freight and passenger rates from time to time. In 1924, practically all freight rates were at least double what they were in 1910 and some were considerably higher The receipts per ton mile of freight in 1913 averaged 0.719 cents; in 1920 this amounted to 1.052 cents and for 1923 an average of 1 115 cents. This is an increase of approximately 55 per cent for the 10 years which is considerably less than the relative increase in the major items of expenditure by the roads. See also the articles RAILWAYS; CANALS.

HISTORY

Wilson Administrations. President Wilson was inaugurated on Mar 4, 1913, the first Democratic President since Cleveland and only the third since the close of the Civil War. He was reelected in 1916. During his two terms in office he selected for his official family the following men: Secretary of State: W. J. Bryan (to 1915), Robert Lansing (to 1920), B. Colby; Secretary of the Treasury, W. G. McAdoo, C. Glass, D F. Houston; Secretary of War, L. M Garrison, N. D. Baker; Attorney General, J. C. McReynolds, T W. Gregory, A. M. Palmer; Postmaster General, A. S. Burleson; Secretary of the Navy, J. Daniels; Secretary of the Interior, F K. Lane, J. B. Payne; Secretary of Agriculture, D. F. Houston, E. T. Meredith; Secretary of Commerce, W. C. Redfield, J. W. Alexander; Secretary of Labor, W. B. Wilson.

Domestic Legislation. Although most of Wilson's administrations were almost completely overshadowed by the events of the War both before and after the entry of the United States, nevertheless the Democratic party under the supreme leadership of Wilson accomplished much of importance in purely domestic affairs.

Financial Legislation. In his inaugural address President Wilson lodged special protest against the Payne-Aldrich tariff which "cuts us off from our proper part in the commerce of the world, violates the first principle of taxation, and makes the government a facile instrument in the hands of private interests; a banking and currency system based on the necessity of the government to sell its bonds 50 years ago and perfectly adapted to concentrating cash and restricting credits; an industrial system . . . which holds capital in leading strings, restricts the liberties and limits the opportunities of labor, and exploits without renewing or conserving the natural resources of the country; a body of agricultural activities never yet given the efficiency of great business undertakings or served as it should be through the instrumentality of science taken directly to the farm, or afforded the facilities of credit best suited to its practical needs: watercourses undeveloped; waste places unreclaimed; forests untended, fast disappearing without plan or prospect of renewal; unregarded waste heaps at every mine."

Tariff Revision. Shortly after his election President Wilson called the 63d Congress into session (Apr. 7, 1913) to revise the tariff downward. Wilson, believing in a closer relationship between the executive and legislative branches of government, delivered his message to Congress personally, thereby breaking a precedent which had existed from the time of the elder

Adams. The leadership in the tariff revision was taken by Oscar Underwood of Alabama, the chairman of the Ways and Means Committee. It was passed in the House without any special difficulty, but the Democratic majority of six in the Senate was scarcely large enough to pass it in toto. The usual bargaining and compromises followed. The Underwood Act as finally passed made an average reduction of 26 per cent on the figures of 1907. The protective system was maintained although an attempt was made to allow a moderate amount of foreign competition. The duty on 958 articles was reduced, on 307 it remained unchanged, and on 86 (mainly in the chemical schedule) it was raised. There was to be no duty on wool after Dec. 1, 1913; the duty on sugar was to be gradually reduced and taken off completely on May 1, 1916; duties on woolens and cottons were heavily reduced. The sugar provisions were never completely carried out owing to the international situation. An important feature of the tariff bill was the income-tax provision which was made possible by the Sixteenth Amendment which was proclaimed in effect Feb. 25, 1913. The law provided a tax of 1 per cent on incomes over $3000 ($4000 in the case of married persons), with an additional 1 per cent on incomes of $20,000 to $50,000; an additional 2 per cent between $50,000 and $75,000; 3 per cent between $75,000 and $100,000; 4 per cent between $100,000 and $250,000; 5 per cent between $250,000 and $500,000; and 6 per cent above $500,000. The tariff board which had been created by the Republicans was allowed to lapse by the Democrats but was revived in 1916 by the appointment of a bipartisan commission of six members for 12-year terms. See TARIFF IN THE UNITED STATES and TAXATION IN THE UNITED STATES.

Federal Reserve System. As soon as the question of the tariff was out of the way, Congress and the President turned their attention to banking and currency. The result was the passage in December, 1913, of the Federal Reserve Act. Generally speaking, this connected the two outstanding weaknesses of the National Banking Act of 1863, which was a war-time measure and adopted primarily for the purpose of supplying a market for United States government gold bonds. The currency which resulted from this act was inelastic and nonfluid It could not be expanded when business warranted, and it could not flow from one section of the country to another in time of need. The act continued the prohibition of the issuance of State bank notes; it put the control of the system in the hands of a group of Federal officials known as the Federal Reserve Board; it created 12 Federal Reserve banks to which all national banks had to belong, other banks allowed to become members; to provide for elasticity of currency it permitted the issuance of paper money backed up largely by sound commercial paper. (See FINANCE AND BANKING.) In order to relieve the situation of the farmers, the Federal Reserve Act was supplemented by the Federal Farm Loan Act of 1916. Under this law farm loan associations are formed in designated areas under conditions prescribed in the law, their members being borrowers only. The borrowers submit applications for loans under specified conditions and restrictions as to size, security, and valuation of the land. See AGRICULTURAL CREDIT.

Antitrust Legislation. With the tariff, and banking and currency problems cleared up, the Democrats turned their attention to the trust problem. President Wilson appeared before Congress on Jan. 14, 1914, and in introducing the question of trust regulation he urged that the problem be approached in a friendly way and stated that the government and "big business" were ready to meet each other halfway "in a common effort to square business methods with both public opinion and the law." Despite this statement Wilson said that it was the purpose of the Democrats "to destroy monopoly and maintain competition as the only effective instrument of business liberty" Two important acts were passed in connection with trust regulation, the Federal Trade Commission Act of Sept. 14, 1914, and the Clayton Antitrust Act of October 15. The first law created a commission of five persons to carry out the antitrust laws and to prevent unfair methods of competition by persons or corporations subject to the antitrust laws. The Clayton Act prevented price discrimination; acquisition of stock in competing companies, interlocking directorates, and the so-called "government by injunction." In 1918 a further trust act provided that the antitrust acts should not apply to companies engaged in export trade. It was hoped that this would encourage large corporations to engage in foreign commerce For further details concerning trusts and trust legislation see TRUSTS.

Labor Legislation. The *Clayton Act* contained very important provisions concerning labor. Human labor was declared not to be a commodity, and therefore labor and agricultural organizations could not be considered combinations in restraint of trade. Injunctions in labor disputes were forbidden unless necessary to prevent irreparable injury to property rights for which there was no remedy at law. Strikes, picketing, and boycotting were declared not to contravene any Federal law. Finally, cases of contempt of court were to be tried by jury, except when the offense was committed in the presence of the court.

In 1915 the *La Follette Seamen's Act* was passed. This required a language test, namely, that 75 per cent of the crew on American-owned or operated vessels should "understand any orders given by the officers of such vessel"; that 65 per cent of the deck crews employed on American vessels should ultimately be able seamen, having passed physical and professional examinations by government officers; made less serious the offense of desertion by members of the ship's crew under special conditions; required half payment of wages to the crew in every port; and required refusal of clearance to a vessel in which, on information to the collector, it was stated that the provisions of the act relating to language and full quota of able seamen had not been complied with. This law lost a good deal of its force through its loose phraseology and diverse constructions put on it by the Department of Commerce. American shipowners claimed that they would be unable to meet foreign competition under the provisions of this act and would be compelled to go out of business.

In 1916 the *Adamson* eight-hour law was passed, affecting railway labor. This act was virtually forced on Congress by the threat of a great strike by the four railway brotherhoods. The chief provision of this act was that from Jan. 1, 1917, employees engaged in train opera-

tion on inter-State steam railroads exceeding 100 miles in length should be paid their present daily wage for the first eight hours and should be paid pro rata for overtime rather than on the basis of time and a half, which was demanded by the brotherhoods. A commission was to be appointed by the President to report back to Congress on the wage increase by Nov. 1, 1917. See RAILROADS.

Further labor measures of importance provided for compensation for Federal employees injured in the performance of their duty, the prohibition of child labor under certain conditions, and an eight-hour day for Alaskan coal miners. For the vicissitudes of the attempt on the part of President Wilson and Congress to regulate child labor through the Federal control over inter-State commerce and taxation, see CHILD LABOR. In 1917 Congress passed an act appropriating millions of dollars to the various States in aid of vocational education. See EDUCATION IN THE UNITED STATES.

Prohibition Amendment. For a complete account of this amendment, including its introduction and passage in Congress, its ratification by the several States, and the passage of the Volstead Enforcement Act, see PROHIBITION.

Woman Suffrage Amendment. See WOMAN SUFFRAGE.

Colonial and Foreign Policies. *Philippines.* As the question of the independence of the Philippine Islands had figured very importantly in Democratic platforms since 1900, President Wilson continually urged on Congress the advisability of giving the islands greater self-government and of definitely promising them their independence. The result was the Jones Organic Act, passed in 1916, which declared in its preamble that it was the purpose of the United States to recognize the independence of the islands as soon as a stable government should have been established. The Senate amended the House bill to the effect that complete independence should be granted within two or, at the discretion of the President, four years. The House killed this provision. The Jones measure abolished the old commission and provided for an upper house elective for all but two members. The suffrage was extended to all males who spoke and wrote a native dialect. Formerly the vote was limited to some 225,000 inhabitants. Under the Jones bill 800,000 could vote. See PHILIPPINE ISLANDS.

Porto Rico also benefited from the colonial administration of the Democrats. The Porto Ricans since the passage of the Foraker Act of 1900 had seriously objected to the preponderance of Americans in the executive council and the denial of full rights of American citizenship. In 1914 President Wilson, by executive order, directed that the Porto Rican Council be changed so that the natives should have a majority. The question of citizenship was settled on Mar. 2, 1917, when President Wilson signed a Porto Rican civil government bill. This measure extended the suffrage, granted an elective upper house, and conferred full American citizenship on all inhabitants. See PORTO RICO.

Alaska. On Mar. 2, 1914, an act authorizing the President to construct, maintain, and operate railroads in Alaska not exceeding 1000 miles in length, at an expense not exceeding $35,000,000, was approved. Construction began in 1915. See ALASKA.

The Caribbean. Although the Democrats followed the policy of granting a greater degree of freedom to the American colonies, they nevertheless greatly expanded the doctrine of Roosevelt in the Caribbean and Latin America by knitting more closely the financial and economic ties which bound the United States to these Spanish republics, and virtually established protectorates over several of them. This policy was contrary to that which many believed the Democrats would follow. (See CUBA; PANAMA). An aggressive American policy in the Caribbean started during Roosevelt's administration when he stepped into *Santo Domingo* to supervise her finances. He explained this step on the grounds that if the United States refused to permit foreign countries to intervene in Latin America to collect their just debts it was only fair to them to have the United States step in and collect them for them. Roosevelt's financial supervision in Santo Domingo was superseded by a virtual protectorate during Wilson's administration. American marines were landed in 1914 to "oversee" the elections. In 1916 the entire country was occupied by American military forces. The government and laws of the country were suspended, and the American marines were supreme. In 1920 a Dominican commission, which had been appointed to aid the American military the year before, resigned because its request for the restoration of the independence of the republic went unheeded See SANTO DOMINGO.

Haiti fell under American domination as a result of a revolution of 1915. American marines were landed to restore order. By terms of a treaty virtually forced on the republic, the control of the finances and the constabulary was taken over by American officers, with the announcement that "the United States government has no purpose of aggression and is entirely disinterested in promoting this protectorate." The occupation was continued until the summer of 1924, when it was announced that the occupation would cease. See HAITI, *History.*

Nicaragua. For the terms of the establishment of the protectorate in 1916, see NICARAGUA, *History.*

Undoubtedly one of the prime reasons for this extended American influence in the Caribbean was the protection of the Panama Canal. In consonance with this policy, the American government purchased the Danish West Indies in 1917. See VIRGIN ISLANDS; see also CENTRAL AMERICAN UNION. See NICARAGUA for a discussion of the acquisition of a naval base in Fonseca Bay and a 99-year lease on the Corn Islands.

Mexico. President Wilson inherited a jumbled Mexican situation from his Republican predecessor. After the murder of Madero in 1913 the country was torn into factions, and civil strife was prevalent under the leadership of Huerta, Zapata, Villa, and Carranza. In the summer of 1914 Carranza became president and had a rather hectic administration, lasting until 1920, when he also was murdered. His successor was Obregon. Although President Wilson shortly after his inauguration announced a policy of "watchful waiting," he was embroiled in two serious conflicts with Mexico, the Tampico and Columbus affairs. The tendering of their good offices by Argentina, Brazil, and Chile averted a serious conflict in the former instance. For the details of American re-

lations with Mexico during President Wilson's administration see MEXICO, *History*.

The Far East. Relations with Japan were strained by the passage of laws by the State of California prohibiting the ownership of lands by aliens who could not be naturalized. Japan protested against the discrimination and the violation of treaty rights, and the President sent Secretary of State Bryan to California in an effort to secure a change in the State legislation, without success. The countries exchanged notes and a modus vivendi was finally arranged whereby the United States agreed to test the laws in the courts, and Japan made promises as to future immigration. In 1917 Secretary of State Lansing and Viscount Ishii, special ambassador from Japan, concluded an important agreement concerning American relations in the Orient. The United States admitted the interest of Japan in China, but both countries agreed to oppose the acquisition by any country of special rights in China which would tend to impair her integrity and sovereignty. (See JAPAN, *History;* IMMIGRATION.) On May 2, 1914, President Wilson recognized the Republic of China despite the fact that he had previously advised American bankers not to participate in the international railway loans affecting that country. See CHINA.

Panama Canal Tolls Act. President Wilson, by exercising his power as leader of the Democratic party, secured the repeal of the Canal Tolls Act which had been passed in the latter part of Taft's administration. The issue had arisen because of the protest of Great Britain that the Hay-Pauncefote Treaty had been violated by the exemption of American coastwise vessels from paying tolls. Wilson in a special message asked for the repeal on the grounds that the law was a mistaken economic policy, a contravention of treaty obligations, and that the repeal would aid him in the conduct of foreign affairs. For the treaty with Colombia see COLOMBIA, *History*.

Dependencies. For the outlying possessions of the United States, see the articles: ALASKA; GUAM; HAWAII; PHILIPPINES; PORTO RICO; SAMOA, AMERICAN; VIRGIN ISLANDS.

Matters pertaining to American activities during the period 1914–24 are also discussed in the following articles: FISHERIES; FINANCE AND BANKING; TELEPHONY; TELEGRAPHY; ELECTRIC MOTORS IN INDUSTRY; ELECTRIC POWER TRANSMISSION; AËRONAUTICS; ARMIES AND ARMY ORGANIZATION; NAVIES OF THE WORLD; EDUCATION; UNIVERSITIES AND COLLEGES; LAW, PROGRESS OF THE. See also the separate articles on the American religious denominations, universities and colleges, and the important cities.

European War. The European War, in which the United States promptly declared its neutrality, had immediate important economic and legislative effects on the country. In August a bill was passed admitting foreign-built ships to the American registry with certain restrictions as to coastwise trade. A War Risk Insurance Act was adopted, providing for emergency insurance for ships. It was promptly seen that the stopping of a large part of the imports would curtail the revenues and produce a deficit. To prevent this development an emergency revenue bill was passed, providing for an increased internal-revenue taxation system. The election of 1914 had for its issues the new tariff law and the record of the President. The Democrats were successful in retaining their majorities in Congress, but they were reduced in the House, the alignment being Democrats 232, Republicans 194, and Progressives 7. In the Senate the number of Democrats was increased to 53 and the opposition reduced to 43. The War greatly increased the export trade, especially in foodstuffs and munitions. Nearly all of this went to the Allies, since German shipping had been practically driven from the sea. To meet the demand for more shipping, the President introduced in December, 1914, a request for a Ship Purchase Bill. The proposition evoked such opposition that the Republicans, in February, 1915, in a prolonged filibuster in which they were aided by seven Democrats, defeated it. In this the President suffered his first serious defeat in Congress.

It was only natural that the United States should be drawn into the vortex of the War long before she became a participant. As the leading neutral, the exigencies of war were bound to affect her rights on the high seas. The situation was very similar to that just preceding the War of 1812. Before the War had lasted very long, intricate complications developed with both Germany and Great Britain. Only a slight sketch of these complications will be given here. (For details, see WAR, DIPLOMACY OF THE.) To Germany Secretary Bryan sent a note declaring that the United States would hold her to "strict accountability," and to Great Britain a firm protest against the prevention of legitimate American trade by means of illegal blockade, interference with mail, and vexatious delays in prize proceedings. Deep irritation had been caused by the destruction of the steamer *Gulflight* by a German submarine and by the seizure of the *Wilhelmina* and *Dacia* by Great Britain and France. The United States, however, was horrified when the *Lusitania*, on May 7, 1915, was torpedoed without warning and more than 1000 persons, including 114 Americans, lost their lives. On May 13 Wilson sent to Germany a strong note demanding a disavowal of the act and indemnity for the violation of American rights, and stating that the United States stood firmly on the ground that Americans had the right to travel on merchant ships of belligerent nationality. Relations between the two countries reached the breaking-point, and many expected and desired war. A large party developed, urging military preparation to meet complications which might involve it in war. Attention was directed toward the large number of Americans of German birth and descent who thought that the United States should preserve true neutrality by prohibiting the export of munitions, which because of the control of the sea went to the Allies exclusively. They emphasized the trade restrictions of Great Britain and alleged that Germany was being deprived of food for its civil population. Notes were interchanged, and the tone of the American notes became more insistent, until on September 1 Germany declared that liners were not to be sunk without warning. Despite the fact that the cases of the *Nebraskan* and the *Arabic*, disavowed on October 5, had arisen and depended on separate negotiations, this announcement was hailed as a Wilson victory. There remained the necessity for Germany to disavow the sinking of the *Lusitania* and to indemnify American citizens. Wilson's position in the correspondence had

caused the resignation of Secretary Bryan (June), who thought that his ideas might lead to war and who urged that Americans should be warned to remain off passenger ships of the warring nations. In the meanwhile the indignation among German sympathizers respecting the supply of munitions to the Allies led to many plans for interfering with this supply by fomenting labor disturbances. Plots were formed and executed involving the explosion of bombs in factories and on steamships. Organized and unorganized labor was tampered with. It was established that the Austrian Ambassador, Dumba, was implicated, and his recall was demanded on Sept 9, 1915 Attachés Boy-Ed and Von Papen of the German Embassy had a similar fate on December 3.

During the short session of Congress an immigration bill was adopted (1915), with a literacy test included, which the President vetoed. In June, 1915, the Supreme Court rendered two important decisions: against the government in the dissolution suit against the Steel Trust, and, secondly, that the grandfather clauses of the Oklahoma and Maryland constitutions were void In December, 1915, the President's message was almost wholly devoted to the championship of military preparedness, although the year before he had opposed those who would turn America into an armed camp At the opening of 1916, the question of preparedness appeared the supreme issue in American politics. In February, 1916, Secretary of War Garrison resigned because he could not agree with President Wilson on the question of national defense He was succeeded by Newton D Baker (q v) of Cleveland, Ohio. In December, 1915, the sinking of the *Persia* in the Mediterranean Sea again brought the controversy over submarine warfare to the fore. While negotiations were pending over this incident the channel boat *Sussex* was torpedoed with a loss of more than 100 lives This aroused considerable comment inasmuch as the *Sussex* was strictly a passenger vessel and unarmed. The question of arming merchantmen for defense presented a serious problem A resolution warning Americans not to sail on armed merchantmen failed to pass both Houses of Congress, indicating that the President was to have a free hand in carrying on foreign affairs. On Apr. 14, 1916, the United States government demanded that a submarine warfare, as it affected neutrals, be abandoned under a penalty of a break in diplomatic relations. For the German reply see WAR, DIPLOMACY OF THE.

Election of 1916. In 1916 Charles E Hughes and Woodrow Wilson were the candidates nominated for the presidency by the Republican and Democratic conventions respectively. Charles W. Fairbanks and Thomas R. Marshall were the vice-presidential nominees An element of the Progressive party nominated Theodore Roosevelt for president, but he declined the nomination and heartily supported Hughes during the campaign Wilson was reelected by an extremely small margin, and the issue was in doubt for several days It was decided only by his success in winning the electoral vote in California The electoral vote stood 277 for Wilson, 254 for Hughes. The popular vote was 9,128,837 for Wilson, 8,536,380 for Hughes. The surprising thing about this election was the fact that Wilson was able to be elected without carrying New York or any of the large eastern States. The result in Congress was to increase the Republican membership in both houses considerably. In the House 217 Republicans were elected, 212 Democrats, and 6 from other parties. In the Senate the Democrats retained their majority, which was cut from 14 to 12.

The War Again. Throughout 1916 the United States was brought nearer to war with Germany. The German submarine *U-53* entered Newport harbor on Oct. 7, 1916, and after delivering mail for the German Embassy, it departed Within the next two days it had sunk one Dutch, one Norwegian, and three British ships within sight of the American coast. The submarine escaped unharmed. The President made efforts during December, 1916, and January, 1917, to bring about a condition among the combatant nations which would lead to peace, he endeavored to secure from both sides a statement of terms on which the War could be honorably concluded. (See WAR, DIPLOMACY OF THE.) Following closely on these efforts, Germany, embarking on a ruthless submarine warfare, declared that all merchant ships found in a forbidden zone would be sunk after Feb 1, 1917, without warning. (See WAR, DIPLOMACY OF THE) President Wilson addressed both Houses of Congress on February 3 and declared that he had directed the Secretary of State to announce to the German Ambassador that all diplomatic relations between the two governments were severed and that the American Ambassador had been recalled from Berlin. The President further declared that he hoped that Germany would not actually embark on the ruthless submarine warfare and that only overt acts on her part would convince him that she would do so There followed a period during which the President waited for such overt acts. In the meantime the government undertook whatever measures were possible looking toward war. Congress attempted on February 26 to give President Wilson authority to supply guns and ammunition to American merchant ships, but the bill was defeated by a filibuster in the Senate. German submarine warfare was carried on with great ferocity, and Allied and American vessels were sunk. Congress was called in special session on Apr. 2, 1917, and the President made an address in which he summarized the offenses of Germany against the United States government and recommended that Congress declare that the course of the German government was nothing less than war against the government and people of the United States A resolution declaring the existence of a state of war was passed by both Houses and signed by the President on April 6.

The Mexican Note. Fuel was added to the rising anti-German feeling in the country by the publication on March 1, on the authority of Secretary of State Lansing, of a note from Germany to Mexico. It said in part: "On the first of February we intend to begin submarine warfare unrestricted In spite of this it is our intention to endeavor to keep neutral the United States of America. If this is not successful, we propose an alliance on the following basis with Mexico: that we shall make war together and together make peace. . . . It is understood that Mexico is to reconquer the lost territory in New Mexico, Texas, and Arizona. The President of Mexico, on his own initiative, should communicate with Japan, suggesting adherence

at once to this plan. At the same time offer to mediate between Germany and Japan." Needless to say, this note amazed and angered the entire country. Japan hastened to affirm in no uncertain tones that she had absolutely nothing to do with the whole affair.

Participation by the United States in the War. Prompt action followed President Wilson's signature of the war resolution. All American ships at foreign stations and the governors and military posts of American insular possessions were notified by wireless of the declaration of war Orders were issued by the Navy department for the mobilization of the fleet, and the naval reserve was called to the colors. The navy at once proceeded to seize all radio stations in the country. Every German and Austrian vessel in the harbors of the country and its possessions were seized. There were 91 of these, aggregating 630,000 gross tonnage. On April 15, the President issued "a call to service" in which he appealed especially to the agricultural and industrial workers of the country to devote their utmost efforts to providing and equipping the armies in Europe He said: "We must supply abundant food not only for our armies and our seamen, but also for a large part of the nations with whom we have made common cause, in whose support and by whose sides we shall be fighting.

"We must supply ships by the hundreds out of the shipyards to carry to the other side of the sea, submarines or no submarines, what will every day be needed there, and abundant materials out of our fields and our mines and our factories with which not only to clothe and equip our own forces on land and sea, but also to clothe and support our people, for whom the gallant fellows under arms can no longer work; to help clothe and equip the armies with which we are cooperating in Europe, and to keep the looms and factories there in raw material: coal to keep the fires going in ships at sea and in the furnaces of hundreds of factories across the sea; steel out of which to make arms and ammunition both here and there; rails for worn-out railways back of the fighting fronts; locomotives and rolling-stock to take the place of those every day going to pieces; mules, horses, cattle for labor and for military service; everything with which the people of England and France and Italy and Russia have usually supplied themselves, but cannot now afford the men and materials or the machinery to make."

War Preparations by the Army and Navy Long before the declaration of war the United States government was engaged in putting its physical forces into first-class condition. On March 25, an executive order was issued, increasing the enlisted personnel of the navy to 87,000 men; on March 26, another order was issued, to increase the Marine Corps to 17,400 men. Immediately after the declaration of war the naval militia, naval reserve, and the Coast Guard passed under the control of the Navy Department. Plans for the mobilization of the army went forward just as rapidly as those for the navy. Before war was declared several National Guard units were called out to do police duty at bridges, etc. The War Department announced that 26 camps, with a capacity of 25,000 men, would be established throughout the country for military instruction to civilians.

Council of National Defense. The economic side of the war was put in the hands of the Council of National Defense, which consisted of the members of the President's cabinet and a civilian advisory committee made up of businessmen and leaders of industry. Numerous boards were appointed, consisting of groups of experts, who were to organize war activities along special lines. The Food Board was placed in the charge of Herbert C. Hoover (q.v.), executive head of the Belgian Relief Commission. This board was to take such measures as would conserve the food supplies of the United States, and at the same time, as far as possible, it was to supply the needs of the Allies. It also dealt with questions of food shortages, distributions, mobilization of agricultural resources, price control, and waste. In November, 1917, it held a "conservation" week, and thousands of families received conservation display cards showing that they would observe "wheatless and meatless" days to aid the government. Other important boards were also instituted. A committee of five was appointed to direct the operations of American railways, which were taken over by the government on Dec. 28, 1917 (see RAILROADS). A General Munitions Board had charge of supplying munitions and equipment to the army and of adjusting the question of whether the government needed a man more in the industrial or military field. This board was later superseded by the War Industries Board The Economy Board was organized to take care of the commercial interests of the country and to purchase raw materials for the government The Medical Board was formed by many prominent physicians to mobilize and organize the medical men and resources of the country. The Federal Shipping Board was one of the most important organizations established. Its problem was to defeat the submarine by building a vast fleet to transport the American army and great quantities of supplies to Europe. It was organized as a $50,000,000 corporation with Colonel Goethals as general manager. The efficiency of this board was marred by continual wranglings over the nature of the vessels to be built. The result was several changes of personnel without apparent harmony of action. Another important board was the Aircraft Board Congress appropriated $640,000,000 for the aërial service, and every one confidently expected that America would take the lead in supplying machines of all types. In September, 1917, a glowing account of the new Liberty motor was given to the public. It was a false hope, however, and it was many months before the engine was perfected; as a matter of actual fact most of the machines used at the front were of foreign make. (See AERONAUTICS.) Congress made strenuous efforts to prosecute the war effectively. Sums of money undreamed of before were appropriated, and many all-embracing war measures, such as the Daylight Saving Law, Espionage Act, Food Act, Fuel Act, Selective Draft Act, etc., were enacted. The people of the country also contributed millions of dollars to volunteer organizations, such as the Young Men's Christian Association, the Young Women's Christian Association, the Salvation Army, the Red Cross, and several others. (For an account of their war services, see the articles on these organizations.) Thousands of businessmen gave up their private interests and worked for the government for a nominal wage.

Enemy Aliens. At the outbreak of the War,

there were approximately 5,000,000 enemy aliens in the United States. An official proclamation was issued, forbidding any enemy alien from remaining or residing "within half a mile of any governmental fort, factory, reservation, base of supplies, or any land used for war purposes," without a permit. Owing to the activities of pro-German sympathizers, President Wilson in November, 1917, ordered all enemy aliens to register and gave the Attorney General power to establish forbidden zones. An enemy property custodian was appointed by President Wilson, with the purpose of seizing all property held by enemy aliens in the United States and of holding it in trust until the close of the War. The total cost of the administration of the property was borne by the businesses themselves, which were taken over by A. Mitchell Palmer, the Alien Enemy Property Custodian. As each enemy-owned enterprise was seized, an effort was made to convert its products to the use of the government in the War. As a result, Palmer said: "when the Armistice was signed, the alien property custodian was supplying the government with magnetos for airplanes and automobile motors, with cloth to make uniforms for the soldiers and dyes with which the cloth was dyed, with medicines, surgical instruments and dressings, with musical instruments, with ball bearings, telescopes, optical instruments, with cocoanut charcoal for the making of gas masks, with glycerine for the making of high explosives and a large number of other and varied products. In some instances the enemy-owned corporations under the alien property custodian's supervision were running 100 per cent of their capacity on government business." More than $700,000,000 of enemy property was taken over by the custodian.

The Draft Act. In the President's message to Congress on Apr. 2, 1917, he submitted the project of raising a national army by conscription. There was tremendous opposition to this, but after a month's debate the President's idea prevailed, and on May 18, 1917, the selective conscription act was passed June 5 was set aside as the day on which all males who had reached their 21st but not their 31st birthday were to register for military service; 9,659,382 men registered. This included aliens. The law authorized the President to appoint a local exemption board for each county and one for each 30,000 population in cities of 30,000 or more. The exemption boards were to be made up of civilians only. Those specifically exempted by the law were Federal and State officials and members of religious sects who had conscientious scruples against war. The President was authorized to exempt "persons engaged in industries, including agriculture, found to be necessary to the maintenance of the military establishments or the effective operation of military forces or . . . the national interest during the emergency." The cards of registrants were numbered in a red-ink serial up to the total number in the district. Alphabetical arrangements were forbidden. Then the numbers were drawn at Washington and the men were called according to the drawing, which took place on July 20. The men were medically examined and those who were physically fit and not exempted were sent to some one of the 16 military cantonments constructed for the training of new recruits; 687,000 were called in this first draft. After this draft was completed, the system of selection was changed (November, 1917). All the remaining registrants were divided into five classes, according to liability for military service. Those in the first class were to be called first, those in the second next, and so on. During 1918 three registration days were set aside on which the various classes of men were to register. What virtually amounted to a second selective draft act was approved by President Wilson on Aug 31, 1918 It provided for the registration of all males between the ages of 18 and 45, with the exception of those who had already registered or who were in the military or naval service of the United States. Approximately 13,000,000 registered on Sept. 12, 1918. Provost Marshal General Crowder announced that the selectives had been classified into five groups. A summary of this classification follows:

Class I: (1) single man without dependent relatives; (2) married man (or widower) with children, who habitually fails to support his family; (3) married man dependent on wife for support, (4) married man (or widower) with children, not usefully engaged, family supported by income independent of his labor; (5) men not included in this or other classes, (6) unskilled laborers

Class II. (1) married man or father of motherless children usefully engaged, but family has sufficient income apart from his daily labor to afford reasonable adequate support during his absence; (2) married man, no children, wife can support herself decently and without hardships, (3) skilled farm laborer engaged in necessary industrial enterprise; (4) skilled industrial laborer engaged in necessary agricultural enterprise

Class III: (1) man with foster children dependent on daily labor for support, (2) man with aged, in firm, or invalid parents or grandparents dependent on labor for support, (3) man with brothers or sisters incompetent to support themselves, dependent on daily labor for support, (4) county or municipal officers, (5) fireman or policeman, (6) necessary artificer or workman in arsenals, armories, and navy yards; (7) necessary customhouse clerk; (8) person necessary in transmission of mails; (9) necessary employee in service of United States, (10) highly specialized administrative expert; (11) technical or mechanical expert in industrial enterprise, (12) highly specialized agricultural expert in agricultural bureau of State or nation; (13) assistant or associate manager of necessary industrial enterprise; (14) assistant or associate manager of necessary agricultural enterprise.

Class IV: (1) married man with wife and (or) children (or widower with children), dependent on daily labor for support and no other reasonable adequate support available, (2) marine in sea service of merchants or citizens in the United States; (3) head of necessary industrial enterprises; (4) head of necessary agricultural enterprise.

Class V: (1) officer of State or the United States; (2) regularly or duly ordained ministers; (3) student of divinity; (4) person in military or naval service, (5) alien; (6) alien enemy; (7) person morally unfit, (8) person permanently physically or mentally unfit; (9) licensed pilot.

In a decision handed down by the United States Supreme Court on Jan. 8, 1918, the constitutionality of the Selective Service Act was upheld See ARMIES; MENTAL MEASUREMENT.

Financing the War. The United States government determined to raise the money necessary for the conduct of the war by three methods: (1) loans, (2) revenue under existing taxation, (3) new taxation. Five loans were floated during the course of the War. The first four were called Liberty Loans and the fifth the Victory Loan. The First Liberty Loan books were opened May 14, 1917, and closed June 15. Two billion dollars' worth of 3½ per cent convertible gold bonds were offered. More than 4,000,000 people bought bonds, and the offer was oversubscribed by more than 50 per cent, necessitating a pro rata arrangement for all those who had purchased more than $10,000. A second loan of $3,000,000,000 was

offered Oct. 1, 1917, bearing 4 per cent interest. Ten million persons offered $4,617,532,300. The Treasury accepted half of the excess The Third Liberty Loan was offered on Apr. 6, 1918. It called for $3,000,000,000 at 4¼ per cent. More than 18,000,000 persons offered $4,176,516,850. The Fourth Liberty Loan called for $6,000,000,000 at 4¼ per cent. More than 21,000,000 subscribers offered $6,989,047,000. The fifth or Victory Loan called for $4,500,000,000, and the rate of interest was fixed at 4¾ per cent. More than 12,000,000 people subscribed $5,249,908,300. For the tax measures passed to help finance the War, see TAXATION IN THE UNITED STATES and FINANCE AND BANKING.

Missions from Abroad. From time to time throughout the War, missions from foreign nations visited the United States to cement the ties of friendship and to make plans to cooperate and carry on the War more efficiently. A British mission headed by Arthur James Balfour (q.v.) was the first to arrive (April, 1917). It was closely followed by a French mission headed by René Viviani (q.v.) They were hailed everywhere. Subsequently missions from Italy, Belgium, Russia, Rumania, and Japan arrived and were cordially received throughout the United States.

Relations with Austria-Hungary. Although Austria-Hungary severed diplomatic relations after the break with Germany, the United States did not immediately declare war. Partly as an aid to Italian morale, war was declared on Dec. 7, 1917. Among the reasons given by President Wilson were the sinking of American vessels by Austrian submarines and the unneutral actions of Dumba, the Austrian ambassador. See AUSTRIA-HUNGARY, *History.*

Peace and After. On Nov. 18, 1918, President Wilson announced that he would attend the Paris Peace Conference in person. He named as peace delegates Robert Lansing, Secretary of State; Henry White, a Republican, formerly ambassador to France, Edward M. House, and Gen. Tasker H. Bliss (q.v.) The President was received in Paris with great enthusiasm, and prior to the meeting of the peace conference he made visits to Great Britain and Italy, where he was hailed as the savior of the world. It should be mentioned that President Wilson and his party received a considerable political setback in the elections held in the United States just six days prior to the signing of the Armistice. Despite a personal appeal by the President to return a Democratic majority, the Republicans carried both houses of Congress and were successful in a majority of the State elections. The President's chief concern at the peace conference was the preparation of the covenant of the League of Nations, and he gave his utmost efforts to this object. After the first draft of the covenant had been prepared, he returned to the United States on Feb. 24, 1919, for a brief visit. There had already developed in Congress, especially in the Senate, a pronounced opposition to the terms of the covenant. This opposition was chiefly centred on Article X, which pledged the signatory powers "to preserve as against external aggression the territory of all the States in the League." President Wilson during his stay in the United States made several addresses in which he defended the covenant. He then returned to Paris. When the Treaty of Versailles was signed on June 28, 1919, the President at once returned to the United States. For a complete discussion of the peace conference and the various treaties which followed the War, see PEACE CONFERENCE AND TREATIES. See also LEAGUE OF NATIONS. For the controversy over what Germany should pay, see REPARATIONS.

Political interest in the United States centred in the deliberations on the peace treaty in the Senate. The many problems of reconstruction, such as the absorption of the millions of soldiers and sailors and laborers who were engaged in war industries, the question of the tariff (q.v.), prohibition (q.v.), woman suffrage (q.v.), finances, and the readjustment of the relationship between the various branches of the Federal government, were all allowed to slumber while the Democrats and Republicans fought over the League of Nations issue. The only bright spot in the controversy was the passage of one real piece of constructive legislation, the Esch-Cummins Bill. This provided for the return of the railroads to private operation and management. For the provisions of this bill, see RAILROADS. The Senate Committee on Foreign Relations having considered the treaty, it was introduced in the Senate on Sept. 28, 1918. There had been added 38 amendments and 4 reservations. The first of these gave the United States the right to withdraw from the League of Nations after due notice had been given. The second freed the United States from any obligation to carry out Article X, noted above. The third reservation provided that the United States should have the power to decide what questions came within domestic jurisdiction. In the fourth reservation the United States declined to submit for arbitration and inquiry any questions dependent on or relating to the Monroe Doctrine. The President had previously, on the advice of ex-President Taft and others, inserted in the League covenant a declaration that the Monroe Doctrine continued to be in force. In the face of the outspoken hostility of the Senate, President Wilson determined to appeal directly to the people in behalf of the League. Consequently he started on a nation-wide speaking tour on September 3 On September 26 he was seized by an apoplectic stroke and was compelled to abandon his tour and to remain in seclusion for months under the care of physicians. He never recovered from this breakdown.

After a long debate in the Senate in which much bitterness developed and 14 revised amendments were introduced, the treaty was defeated with the Lodge reservations by a vote of 55 to 39 on November 19. The treaty was reintroduced in the next session of Congress and was again decisively defeated by a vote of 49 to 35. On Apr. 30, 1920, Senator Knox introduced in the Senate a resolution providing for a declaration of peace with Germany. This resolution was adopted by both Houses but was vetoed by the President. Although there was an evident and ever-increasing desire to end the deadlock over the treaty with some form of compromise, both sides were finally compelled to leave the question to a "solemn referendum" of the people in the Presidential election of 1920. In the debate in the Senate, the leaders of the fight for ratification were Senators Swanson of Virginia and Hitchcock of Nebraska. The chief opponents of the ratification were Lodge of Massachusetts, Borah of Idaho, and Johnson of California. Robert Lansing (q.v.), Secretary of

State, resigned on Feb. 13, 1920, as a result of severe criticism by the President of his action in summoning the cabinet in session during the illness of the President. He was succeeded by Bainbridge Colby (q.v.).

Election of 1920. The Republican candidates for the nomination prior to the convention were Gen. Leonard Wood, Governor Lowden of Illinois, Senator Hiram Johnson of California, and Herbert Hoover. The leading Democratic candidates were William G. McAdoo and Gov. James M. Cox of Ohio. The Republican national convention met in Chicago on June 8. The forces of General Wood and Governor Lowden were evenly matched, but both were made unavailable by the disclosures of huge campaign funds which were injudiciously spent in some cases. On June 12, Senator Warren G. Harding (q.v.) was nominated for the presidency, and Calvin C. Coolidge (q.v.) was selected as vice-presidential candidate. At the Democratic convention which met at San Francisco on June 28, Governor Cox (q.v.) was nominated for president and Franklin D. Roosevelt (q.v.) as his running-mate. The campaign which followed was exceedingly aggressive, especially on the side of Cox, who, touring the country, made speeches in defense of the League of Nations in practically every State. Senator Harding remained at home, where from day to day he addressed delegations. The Republicans for the most part ignored the League of Nations and directed their attacks against the administration of the President. In the election in November, Harding and Coolidge received 16,181,289 popular votes, against 9,141,753 for Cox and Roosevelt. The electoral vote was 404 to 127. The nineteenth amendment, providing for woman suffrage (q.v.), had been adopted prior to the election, and the women for the first time participated in the election of a president. This accounts for the large popular vote cast.

Administration of Harding and Coolidge. President Harding was inaugurated on Mar. 4, 1921. He at once announced the members of his cabinet as follows: Secretary of State, Charles E. Hughes of New York; Secretary of the Treasury, Andrew W. Mellon of Pennsylvania; Secretary of War, John W Weeks of Massachusetts; Secretary of the Navy, Edwin C. Denby of Michigan, Secretary of the Interior, Albert B. Fall of New Mexico; Postmaster General, Will H Hays of Indiana; Attorney General, Harry M. Daugherty of Ohio; Secretary of Agriculture, Henry C. Wallace of Iowa; Secretary of Commerce, Herbert Hoover of California; and Secretary of Labor, James J. Davis of Pennsylvania. On March 23 the President issued a call for a special session of the new 67th Congress, for May 11, 1921. Congress at once took up the consideration of measures looking toward economic and financial reconstruction. An immigration bill, which limited the immigrants of any nationality during the fiscal year to three per cent of the number of that nationality in the United States at the Census of 1910, was passed. For further details and later changes in the immigration law, see IMMIGRATION. An emergency tariff bill was passed and approved by the President on May 27. For the provisions of this measure and the subsequent Fordney-McCumber Act, see TARIFF IN THE UNITED STATES. A budget law was also enacted. See FINANCE AND BANKING. The appropriations for the army and navy were radically cut down, and by the terms of the Army bill the army was limited to 150,000. See ARMIES. For changes in the tax laws, see TAXATION IN THE UNITED STATES.

Peace with Germany. The Senate passed on April 30 a measure which, previously offered by Senator Knox, declared the war between the United States and the Central Powers at an end, and repealed the declaration of war. This was followed by the preparation and ratification of a peace treaty with Germany. By the terms of this treaty the United States is not bound by any of the provisions of the Versailles Treaty which relate to the League of Nations. It reserves to the United States whatever favorable concessions are made by Germany to the Allied powers. The treaty was signed by Germany and the United States on July 2, 1921, and ratifications were exchanged in November of the same year.

Washington Conference. The details of the disarmament agreement and the settlement of the problems of the Pacific will be found under the title WASHINGTON CONFERENCE.

Industrial Unrest. The latter half of 1922 and part of 1923 were periods of industrial unrest. A general strike of the coal miners in both the anthracite and bituminous fields, threatening for months, was declared in the bituminous fields on Apr. 1, 1922, at the expiration of the two-year contracts between the miners and the operators. Work ceased in the anthracite mines a few months later. Serious disorders were prevalent The situation was the subject of remedial legislation in Congress. (See COAL; STRIKES AND LOCKOUTS.) No less serious than the coal strike was a general strike of the shopmen in all the railroads of the country which was declared on July 1, 1923. See RAILROADS; STRIKES AND LOCKOUTS.

Foreign Relations During the period, affairs in Europe seemed to go from bad to worse. The foreign policy of the Harding administration was to keep aloof. The American troops were gradually withdrawn from Europe, and when France and Belgium in January, 1923, seized the Ruhr (q.v.), the remaining American troops were withdrawn from the occupied zone. The question of the debt owed by foreign countries to the United States was vexatious. There was much propaganda for the canceling of these debts, but the majority opinion seemed to favor their collection. Early in 1923, a British financial mission, headed by Stanley Baldwin, came to the United States and successfully negotiated for the payment of the British debt. (See FINANCE AND BANKING.) On Feb. 24, 1923, President Harding sent the Senate a message asking for participation by the United States in the International Court of Justice erected at The Hague by the League of Nations. President Harding emphatically stated, however, that he intended no obligations under the League of Nations covenant.

Coolidge in Office. In June, 1923, President Harding (q.v.) started on a trip through the West and Alaska. At Seattle he became very ill and died at San Francisco on August 2. Calvin Coolidge (q.v.) was sworn into office early in the morning of the next day and immediately assumed the presidential duties. In his first message to Congress, Coolidge favored the World Court but opposed the League of Nations; he favored reduction of taxation and opposed the bonus. The League of Nations issue

was raised again in November, 1923, when Woodrow Wilson (q.v.) in a radio message deplored the "shameful fact" of the United States' withdrawal from all "responsible part in the administration of peace." This was Wilson's last public address. In January, 1924, he became critically ill and died on February 3.

Investigations and Scandals. Unfortunately for him, President Coolidge inherited a series of scandals which involved men holding prominent positions. The resignation of Albert B Fall (q.v.) as Secretary of the Interior was followed by an investigation of the leasing of the oil fields by the Navy and Interior Departments. President Coolidge was advised by Attorney General Daugherty to appoint counsel from both parties to investigate and to prosecute any one guilty of irregularities or criminal action in connection with the leases. Consequently President Coolidge, in a statement made on Jan 27, 1924, said: "Counsel will be instructed to prosecute these cases in the court so that if there is any guilt the guilty persons will be punished; if there is any civil liability it will be enforced; if there is any fraud it will be revealed; and if there are any contracts which are illegal they will be canceled" The oil scandal arose from the turning-over of public oil reserves in California and Wyoming to the E. L. Doheny (q.v.) and H. F. Sinclair (q v.) interests by Secretary Fall. This had been preceded by a transfer of the control of the oil fields from the Navy Department to the Interior Department. On investigation it was discovered that Fall had been the recipient of a $100,000 "loan" from Doheny. His testimony relative to this "loan" was rambling and unsatisfactory. He and Sinclair were subsequently indicted by a Federal grand jury. The name of William G. McAdoo was drawn into the controversy when it was shown that his law firm received a large retaining-fee from the oil interests shortly after he resigned from the office of Secretary of the Treasury. This played a prominent part in his failure to receive the Democratic nomination in 1924. Franklin K. Lane was another former cabinet official employed by the oil interests. Senator Pomerene and Mr. Roberts were appointed by President Coolidge as special counsel to investigate and prosecute the oil frauds. Secretaries Denby and Daugherty were compelled to resign. They were succeeded by Curtis D. Wilbur (q.v.) and Harlan Stone (q.v.).

Another amazing and serious scandal arose in connection with the administration of the United States War Veterans' Bureau. A Senatorial investigation committee reported that the Bureau should be completely reorganized. It had failed miserably to provide for disabled veterans, and the efficiency of the Bureau had been impaired by corruption, inefficiency, extravagance, political pressure, etc. The former director, Col. Charles R. Forbes, and James Thompson, a contractor, were indicted by a Federal grand jury on charges of bribery and corruption in connection with the award of contracts for building veteran hospitals.

Presidential Conventions, 1924. The Republican convention met on June 10, 1924, at Cleveland, Ohio. The "keynote" address was made by Theodore Burton of Ohio. The platform adopted on June 12 was preferred to a platform submitted by Senator La Follette. The platform continued the policy of aloofness in foreign affairs, although it approved the World Court idea. It also provided for the collection of foreign debts, the continuance of the high protective tariff, and other planks too numerous to mention. The question of the Ku Klux Klan (q.v.) was completely ignored. The nominations were easily disposed of. Calvin Coolidge was nominated on the first ballot for the presidency, and Gen Charles G. Dawes (q.v.) was nominated on the third ballot for the vice presidency. Governor Lowden (q v.) of Illinois was nominated on the second ballot but refused to run.

The Democratic convention, opening in New York City on June 24, lasted until July 10, 1924. It was the longest in the history of the country. This is accounted for by the inability of the delegates to reach a decision on the presidential nominee until the 103d ballot. The two most prominent candidates were William G. McAdoo (q v.) and Alfred E. Smith (q.v.) Owing to the exigencies of the two-thirds and unit rules, neither was able to obtain the nomination, although each was able to check the other On the 103d ballot John W. Davis (q.v.) was nominated. Governor Bryan (q.v.) of Nebraska was nominated for the vice presidency on the first ballot. Although a tremendous effort was made to incorporate a plank denouncing the Ku Klux Klan (q.v.), the result was a colorless plank, so indefinite as to mean nothing A similar plank was incorporated with regard to the League of Nations.

A third party appeared in the field when Senators La Follette (q.v.) and Wheeler (q v.) were nominated by a convention in Cleveland in July, 1924 This party was endorsed by the executive council of the American Federation of Labor

Presidential Election. Coolidge and Dawes were elected, November 4, by a substantial majority.

UNITED STATES MILITARY ACADEMY. A government institution at West Point, N. Y., for the practical and theoretical training of cadets for the military service of the United States, opened in 1802. Through an act of Congress in May, 1916, the maximum number of cadets permitted to be enrolled in the academy was raised to 1334 by the appointment of one additional cadet from each congressional district, additional cadets from the United States at large, and from the ranks of the enlisted men in the regular army and the national guard who are between the ages of 19 and 22, and have served not less than one year. Under this act the enrollment reached its highest mark, 1262, in 1921, and stood at 1225 in 1923–24, as compared with 661 in 1914. A plan was adopted in 1916 admitting applicants on certificate from accredited schools and colleges as well as by examinations. This applied to mental qualifications only. During the War the entire schedule was shortened to furnish officers for the service more quickly, and two classes were graduated before their normal time in 1918. The maximum age for admission to the academy was extended in 1920 from 22 to 24 years for men who served in the armed forces of the United States during the War. A new cadet hospital was practically completed in 1923. A new schedule of studies went into effect Jan. 1, 1924. The superintendents and commandants during the decade were as follows: Col. Clarence P Townsley, 1914–16; Col. John Biddle, 1916–17; Col Samuel E. Tillman, 1917–

18; Brig.-Gen. Douglas MacArthur, 1919–22; Brig.-Gen. Fred W. Sladen, 1922–

UNITED STATES NAVAL ACADEMY. A school for the training of naval cadets at Annapolis, Md., founded in 1845. The United States Naval Academy during the period from 1914 to 1924 underwent the greatest change in its history The student body was more than trebled by the Act of Congress of Feb. 15, 1916, increasing the number of midshipmen from two to three, the Act of Mar. 4, 1917, permitting the Secretary of the Navy to appoint 100 midshipmen from the enlisted force of the navy; the Act of Apr. 25, 1917, increasing the number of appointments to four, and the Act of July 11, 1919, permitting an increase in the number of appointments of midshipmen to five for each senator and congressman. An act approved Mar. 4, 1917, authorized the President of the United States, at his discretion, to reduce the course of instruction at the Naval Academy from four to three years (operative during the War), which permitted midshipmen to graduate after having completed a three-year course.

During the period of the War, while the Naval Academy was working at its full operative strength, a large number of ensigns from the enlisted personnel and reserve force were given an intensive course, and of this number more than 1200 were given certificates of graduation and assumed duties as officers in active service. During the above period a great change was made in the course of instruction. Physical requirements were increased. There was also introduced during this period the method of accepting certificates from colleges and high schools for admission to the Naval Academy in lieu of mental entrance examinations. The scope of the course was greatly extended and the entrance requirements correspondingly increased, until they were perhaps as difficult as those of any college in the country.

The Regiment of Midshipmen in 1923–24—nearly 2500—was the largest in history. Superintendent, Rear-Admiral Henry B Wilson.

UNITED STATES STEEL CORPORATION. See TRUSTS.

UNIVERSALISTS. Universalism has been defined as the doctrine or belief that it is the purpose of God to save every member of the human race from sin Thus it is claimed that Universalism is as old as Christianity, but the Universalist denomination is of modern origin, and is confined mostly to the American continent. The General Convention has jurisdiction over the ecclesiastical organizations of the church The membership of the denomination increased from 51,716 (estimated) in 1913 to 59,050 in 1923, the number of churches decreased from 709 to 651, and the number of ministers from 702 to 575. The number of pupils in the Sunday schools increased from 30,000 to 38,442. The commission on social service carried on a campaign to interest ministers, divinity students, and members of church clubs and societies in its work. In 1919, a great drive was launched to reëstablish the church more firmly and raise $1,000,000 to carry on its work. With the receipts from this drive, new mission churches were established in the South and West, new buildings were built in Japan for church, school and residence purposes, and a better organization and more perfect supervision of mission work was made possible. The General Sunday School Association, the religious education department of the church organized at the beginning of the period, carried on a notable work. The Women's National Missionary Association increased its home and foreign missionary work, and purchased the birthplace of Clara Barton, a loyal Universalist, for use as a shrine and in some form of social service work. The General Convention established the department of social welfare on a permanent basis with a full-time director who aided the churches to make the most of their opportunities in this line of work. A movement was under way in 1924 to build a Universalist National Memorial Church in Washington, D. C., to rebuild the destroyed church in Tokyo, Japan, and at the same time erect a Christian home for students in that city. A Ministers' Pension Fund was also established which was eventually to provide for the needs of aged ministers. In addition, the regular budget of the Convention was greatly increased to provide for the continuation of the work started by the drive funds. In celebration of the one hundred and fiftieth anniversary of the foundation of the denomination, the Murray Anniversary Crusade for membership was carried on in 1920, and was continued thereafter with renewed emphasis and scope under the name of the Christ Crusade The Universalist Comrades, an organization for men, was established in 1919 to aid the larger projects of the denomination.

UNIVERSITIES AND COLLEGES. A total of 670 universities, colleges and professional schools reported to the United States Bureau of Education for the school year 1919–20. These institutions enrolled 521,754 students. Of these, 38,398 men and 20,911 women were in preparatory departments; 212,405 men and 128,677 women in collegiate departments; 9837 men and 5775 women in graduate departments; 53,295 men and 3836 women in professional departments; and 27,533 men and 38,326 women were registered as unclassified or special students. The public institutions enrolled 134,007 men and 61,869 women, and the private institutions 200,219 men and 125,659 women.

The schools of theology enrolled 7216 students; the schools of law, 20,992 students; the schools of medicine, 14,242 students; the schools of dentistry, 8809 students; the schools of pharmacy, 5026 students; and the schools of veterinary medicine, 908 students. There were 94,838 students who attended summer schools, and 83,100 students were registered for extension and correspondence courses

The figures for attendance in 1919–20 were much larger than those for 1918. The increase for total numbers of students was 39 per cent. It was evident that the increases after 1920 were not as great. Prof Raymond Walters of Swarthmore College collected detailed reports of attendance from 30 typical universities and general reports from 151 leading universities and colleges. He reported in *School and Society* for Feb. 16, 1924, that "the 1923 advance over 1922 in full-time regular students in 134 of these institutions which reported both last year and this, was 3 per cent; the increase of 1922 over 1921 in 123 institutions had been 2 per cent. In grand total enrollment the 1923 gain over 1922 was 6 per cent, as compared with 14 per cent for 1922 over 1921. These percentages are markedly smaller than the percentages of

1919 to 1921 increases. Nevertheless, even at the diminished rate, the numerical gain this year at some of the larger state universities exceeds what used to be the total enrollment of the old-time New England college" The enrollments of students in some of the institutions reached astonishing numbers. The 10 institutions having the largest enrollments of full-time, part-time and summer-session students for 1922–23 were: Columbia, 28,861 students; California, 23,139; College of the City of New York, 17,055; Pennsylvania, 14,632; New York University, 14,385; Minnesota, 12,322; Chicago, 12,191; Michigan, 11,162; Wisconsin, 11,088; and Illinois, 10,557. The University of California also reported 11,767 extension students. If these are added to the number in residence the institution was dealing with 34,906 students.

In the summer schools for 1923, Columbia with 12,675 students ranked first. The University of California was second with 10,258 students. The next schools in order of size were: third, Chicago, 6375; fourth, College of the City of New York, 5457; fifth, Wisconsin, 4710; sixth, Minnesota, 4540; seventh, Virginia, 3129; eighth, Michigan, 3054; ninth, Colorado, 2888; tenth, Texas, 2658.

Degrees. In 1920, the universities and colleges conferred 23,272 baccalaureate degrees on men and 15,280 on women. Graduate degrees were conferred on 3457 men and 1396 women. Included in the graduate degrees were 439 Ph.D. degrees conferred on men and 93 on women. The schools of theology conferred 588 degrees; the schools of law, 3273; the schools of medicine, 2806; schools of dentistry, 865; schools of pharmacy, 1023; and the schools of veterinary medicine, 219. A total of 989 honorary degrees were conferred.

Property. It was estimated that in 1920 the universities, colleges and professional schools owned grounds worth $110,555,552; buildings worth $355,733,981; dormitories worth $69,393,142; and library and equipment worth $110,847,727. The productive funds were $556,350,140.

Receipts. The total receipts of the universities, colleges and technological schools for 1919–20 were $240,141,994, of which $50,906,752 was for increase of endowment. About 26 per cent of the income was derived from student fees. The per cent of income derived from student fees had not changed materially since 1900, when it was 27.5 per cent. The per cent of income derived from productive funds in 1890 was 28 2 per cent; in 1900, it was 17.3 per cent; in 1910, it was 13.9 per cent; while in 1920, it was only 10.9 per cent. States and cities supplied about 22 per cent of the funds; the Federal government about 5 per cent; while private benefactions contributed about 27 per cent of the receipts of these institutions. The income per student in 1900 was $145; in 1910, $258 and in 1920, $363. The amount of productive funds per student had not increased much since 1900, when it was $843. In 1910, it was $946 and in 1920, $1066. The average value of all property per student, exclusive of productive funds, was $986 in 1900; $1215 in 1910; and $1239 in 1920. The value of the properties of these institutions barely kept pace with the increase in students.

Gifts and Benefactions. For the year 1919–20, a total of 88 universities, colleges, and professional schools reported gifts above $100,000, making an aggregate of $54,734,197. The total amount reported by all of the institutions was $67,417,156. This was nearly twice the amount reported for any previous year. Since 1871, the first year for which statistics are available, at least $900,000,000 had been given to education. In the latter years large sums were given for medical education. Columbia received more than $12,000,000, and Johns Hopkins and Vanderbilt University at Nashville, Tenn, each more than $8,000,000 for medical education, while the University of Rochester had $9,000,000 available for the establishment of a medical school. Several other institutions received smaller amounts for the same purpose. The General Education Board, the Carnegie Corporation and the Rockefeller Foundation exerted large influence on medical education and each was generous with its gifts.

Academic Freedom. Various cases of alleged breach of academic freedom agitated college administrators and faculties during this decade. In some institutions professors were dismissed because of utterances or acts outside of their classrooms. One of the most serious difficulties occurred in Columbia University when Dr. James McKeen Cattell was dismissed from the chair of psychology which he had held for a period of 26 years. The immediate cause of Dr. Cattell's dismissal was certain letters that he had written to members of Congress urging them to oppose the sending of conscripts to Europe. Following Dr. Cattell's dismissal, Professor Beard resigned as an expression of disapproval of the attitude of the trustees He said: "I am convinced that while I remain in the pay of the trustees of Columbia University I cannot do effectively my humble part in sustaining public opinion in support of the just war on the German Empire or take a position of independence in the days of reconstruction that are to follow. For this reason I herewith tender my resignation as professor of politics" Professor Cattell carried his case into the courts where a financial settlement was eventually reached.

Later the students and faculty of Clark University were involved in a controversy which arose because of President Atwood's refusal to let Mr. Scott Nearing lecture before a voluntary group of students. The faculty was divided in its opinion regarding the propriety of the president's action. The student body also took sides and for a time the matter received pronounced consideration in the public press, where opinion was again divided.

The enforced resignation of Alexander Meiklejohn as president of Amherst College, and the issues which led to this action on the part of the trustees, attracted widespread interest and were regarded by the press as significant of the educational, financial and administrative problems of the American college. President Meiklejohn went to Amherst in 1912 from Brown University, with a special programme to modernize the curriculum, develop courses in history, social science and political economy and to emphasize the unity of the educational process. It was generally admitted that he had raised the intellectual standards of the college to a high plane by creating an eagerness for learning and promoting a spirit of inquiry among his students. That the issues in the controversy were those of conservatism versus liberalism were emphatically denied by the

trustees. Two factions seem to have brought strong pressure to bear upon the board for his dismissal: the faculty and alumni. With the students, he was almost wholly successful. When the question of his removal was mooted, a committee of the graduating class interviewed the trustees in his behalf and when his tenure was ended, thirteen declined to receive their degrees. The trustees seem to have been won to the merits of his plan of education and to have supported it for a time, retreating at last in the face of opposition and expediency. With his faculty, President Meiklejohn was not so successful, it being said that two-thirds of its members were opposed to him. The majority of younger members were his followers. The causes for disunity in the faculty were attributed by some to his peculiar temperament and methods of administration in securing curricular changes; he was accused of misrepresentation of their views to the trustees and attacked for an alleged radical policy of retirement, removal and appointment. The president had the hearty support of the younger alumni, but the older and more influential graduates were against him and for various reasons. He was accused of being a pacifist, he was held responsible for an anti-religious spirit among the students; he was regarded as advocating Bolshevist principles; and to his denunciation of exaggerated interest in intercollegiate sports and the corrupting influences of professionalism were traced recent failures of the college's athletic teams. Other influences which it is thought were brought to bear upon the trustees were the mishandling of his personal finances and maladministration of affairs of the college in general. At the commencement meeting the trustees informed the president it was considered madvisable for him to continue as administrative head of the college and his resignation was requested, tendered and accepted. He was offered a professorship of logic and metaphysics but declined

President Lowell in one of his reports holds that the professor's classroom utterances on his own subjects "ought to be absolutely free." The instructor should also be free to publish the results of research, provided they are in scholarly form. The instructor is not, however, at liberty to consider in his classroom subjects that do not relate to his specialty. President Lowell believes that it is unwise for an institution to attempt to assume responsibility for the actions and utterances of instructors outside their own classrooms. He says, "There is no middle ground. Either the university assumes full responsibility for permitting its professors to express certain opinions in public, or it assumes no responsibility whatever, and leaves them to be dealt with like other citizens by the public authorities according to the laws of the land." The position taken by President Lowell was probably a fair statement of the attitude held in most institutions in the year 1924.

One effect of the difficulties relating to the freedom of college and university professors was the establishment of an association known as the American Association of University Professors. The meeting called for the purpose of organizing this association was held in New York City in 1915. Over 250 were in attendance. The permanent chairman, Prof. John Dewey, in an introductory address set forth the purposes of the proposed association. He said: "We are in a period of intense and rapid growth of higher education. No minister of public education controls the growth; there is no common educational legislature to discuss and decide its proper course; no single tribunal to which moot questions may be brought. There are not even long-established traditions to guide the expansive growth. Whatever unity is found is due to the pressure of like needs, the influence of institutional imitation and rivalry, and to informal exchange of experience and ideas. These methods have accomplished great things. Within almost a single generation our higher education has undergone a transformation amounting to a revolution. And I venture to say that, in spite of the deficiencies we so freely deplore, no country has at any time accomplished more in the same number of years. . . . The need of a voluntary organization is the greater because of certain facts in the history of the American university. The rapid growth already referred to has occurred under a machinery designed for very different conditions. We are doing our educational work under methods of control developed decades ago, before anything like the existing type of university was thought of. Our official methods of fixing fundamental educational policy as well as of recruiting, appointing, promoting, and dismissing teachers, are an inheritance from bygone conditions. Their lack of adaptation to the present situation is due not to sinister intent, but to the fact that they are a heritage from colonial days and provincial habits. The wonder is not that there is so much restlessness and friction, but that there is not more. A system inherently absurd in the present situation has been made workable because of the reasonableness and good will of the governors on one side and, even more, of the governed on the other. Let me add that I can think of nothing so well calculated to lift discussions of educational defects and possibilities from the plane of emotion to that of intelligence as the existence of a truly representative body of professors." Newspaper reports had frequently asserted that the purpose of the association was to safeguard the cause of academic freedom. Professor Dewey maintained that cases of infringement upon the rights of instructors were "too rare to demand or even suggest the formation of an association. Existing learned societies are already disposed to deal with cases of infringement as they may come to light The existence of publicly recognized and enforced standards would tend almost automatically to protect the freedom of the individual and to secure institutions against this abuse." The Association held annual meetings and its committees investigated and reported upon difficulties in which various members of the Association were interested.

Admission Requirements. The great increase in the number of students seeking admission to college led college administrators to consider the possibility of a wiser selection of students. There was some experimentation and a large amount of discussion in reference to determining who should go to college. One group of college administrators took the position that in view of the limitations that are necessary the benefits of college and university education should be given to those who possess superior intellectual capacities. They advocate the elimination from college of the mediocre. Dartmouth College, for example, endeavored to make

intellectual capacity indispensable. In addition to this, however, candidates for admission must show positive quality and character with range of interest and must demonstrate their ability in school activities. The occupations of the parents and the location of their homes also formed part of the basis for selection. There were other college administrators who held that the mediocre have also a right to higher education. They emphasized better teaching in college as a cure for many of the difficulties that had arisen in connection with the mediocre. Committees representing college and university administrators financed by the Commonwealth Fund were studying different aspects of college administration with a view to ascertaining whether there should be changes in the organization of instruction. They raised the question as to whether four years of academic training, followed by several years of professional training, were actually required for the profession of dentistry and some of the other professions. When completed, the findings of this committee were expected to be of great importance in settling many of the problems that relate to admission of students.

Some form of intelligence testing was in use in a large number of institutions. Among the membership of the Association of American Colleges, 115 institutions, or 42.2 per cent of the total membership, reported in 1924 that tests were being used; 62 institutions, or 25.6 per cent of the total membership, reported that they were not used and had not been used. Seven institutions, or 2.6 per cent, reported that they had been used in the past but had been discontinued. Forty-eight of the institutions used the tests for the purpose of giving educational advice; 28 for the purpose of giving vocational advice; while 19 institutions used them in connection with admission to college.

The validity of mental tests in so far as they affect the selection and grading of students in colleges and universities had not received sufficient attention to become established. Brown University had for a series of years made very careful studies of mental testing in its student body. Those in charge of the work were among the most competent psychologists of the country. Tests were carried through a period of four years beginning with the class in its freshman year and ending with them as seniors. The late Stephen S. Colvin, who conducted the investigation, presented the following conclusions in an article appearing in the *Educational Review:*

"1. The term 'general intelligence' still awaits final definition. In the light of our present knowledge we are justified in assuming that it designates an innate learning capacity, which, however, can be developed only through learning. This means that it is the province and the duty of the schools to develop that capacity to its highest degree, and in those directions in which it may be most completely and helpfully realized. To recognize the limitations and the lines of direction of learning ability is not to assume an attitude of fatalism in regard to groups of individuals. Indeed it is equally fatalistic to act on the assumption that all men are born free and equal

"2. There is no reasonable doubt that the present intelligence tests do indicate to a fair degree native ability to learn. When employed with due caution they can be used to determine grading, promotion, and elimination. They are valuable in indicating the probable success of pupils in school and students in college. However, they alone are not sufficient to guide the teacher and administrator. In the first place, the present intelligence tests are not perfect instruments for measuring innate mentality. They frequently measure much more; at times they measure much less. Again, school success is determined by many factors other than intelligence. Not only do character qualities, temperamental tendencies, habits, and ideals of work, play a large part in school achievement, but good teaching has an important rôle to play as well. While you cannot make a silk purse out of a sow's ear it has been found possible (so a recent report states) to make a very good substitute.

"3. The testing movement is open at present to various dangers. It is in a critical stage, and although I am confident it will 'muddle through,' it needs to observe due caution and employ some of the intelligence that it seeks to discover. Its friends are too frequently overextravagant in their claims They have taken advanced ground too rapidly and have not sufficiently cleared up the positions earlier occupied. Its foes, or rather its critics, thus find vantage points for counterattacks. They see its exaggerations and its absurdities, and they fail to take account of its fundamental strength and the impregnable character of its ultimate lines of defense. The impressive results already secured by intelligence testing, since Binet with the insight of genius first gave to the world his scale of 1905, cannot be gainsaid. They are facts, sometimes wrongly interpreted, frequently misunderstood, and still lacking final and complete formulations, but they are facts that cannot be ignored, above all they are facts that can be applied and do work, if one has the insight to apply them, and the patience to use them in a really efficient manner

"4. Before intelligence testing can establish itself firmly and permanently as a factor in our scheme of education, various things must be accomplished. In the first place, intelligence scales must be perfected and improved. They must contain elements that appeal to other abilities than those conditioned largely by verbal knowledge and fluency. There must be developed tests that measure fundamental thinking ability and rational power. Tests must be given to the same individual not once, but several times, and they must have a still better technique of scoring and administration than has yet been worked out. Further and more searching statistical methods must be adopted and applied. In addition, tests to determine qualities of character and temperament must be developed Purposes and ideals must be discovered and measured But all of these things will in themselves be of little avail if also there is not an emphasis on the methods and aims of teaching, if there is not the personal touch between teacher and pupil, and if there is not insight, sympathy, and a modicum of common sense."

American University Union in Europe. This union, maintained by 50 American universities and colleges, acts as a clearing house of student efforts for Europe and America. A report by Prof. Paul Van Dyke, of Princeton, director of the Continental Division, gave the following summary of the assistance given to students:

"For the calendar year beginning Mar. 15, 1921, the total reached 1348 students, representing 174 American educational institutions and 46 States and the District of Columbia. These students were distributed among 49 different French institutions, including 16 of the 17 provincial universities and a wide range of other representative institutions. Equally significant is the fact that the service of the Union is now fairly evenly divided between women and men students. Of the total, 632 were women and 716 men."

American-Scandinavian Foundation. This foundation established traveling fellowships of the value of at least one thousand dollars to be awarded to students, men and women, for technological research and humanistic study in the universities of Sweden, Denmark and Norway.

American Field Service Fellowships for French Universities. The Society for American Field Service Fellowships for French Universities offers fellowships in French universities. These fellowships are awarded after open competition among graduates of American colleges and "other suitably qualified candidates." They are for the purpose of encouraging advanced study and research in French

universities. The fellowships, of the annual value of $1200, are granted for one year and are renewable for a second year. They may be awarded in any one of a considerable number of fields. The successful candidates are required to matriculate in a French university for the following session. Applicants must be citizens of the United States between 20 and 30 years of age and come within one of the following classifications: (1) graduates of a college requiring four years of study for a degree, based on 14 units of high-school work; (2) graduates of a professional school requiring three years of study for a degree; (3) if not qualified in either of these ways, must be 24 years of age and have spent five years in an industrial establishment requiring technical skill.

UNRUH, FRITZ VON (?–). A German writer, born at Oranien. His attitude toward militarism aroused much comment. He is the author of the plays *Offiziere* (1910); *Stürme* (1914), and *Prinz Louis Ferdinand von Preussen* (1914); a volume of verse, *Vor der Entscheidung* (1915); and a story founded on his experiences at the front, *Opfergang* (1915), translated into French as *Verdun*. He also wrote *Ein Geschlecht* (1916), *Platz* (1920), and *Rosengarten* (1923), plays which continue his independent line of thought.

UNTERMEYER, LOUIS (1885–). An American poet and journalist (see VOL. XXII). The fifth edition of his *Challenge*, which was first published in 1914, appeared in 1920. Among his other productions since 1914 were: —*And Other Poets*, parodies (1916); *These Times* (1916); *Translations from the Poems of Heinrich Heine* (1917); *Including Horace*, translations and parodies (1919); *The New Adam* (1920); *Heavens, a Book of Burlesques* (1922). He edited: *Modern British Poetry* (1920); *Modern American Poetry* (1921); *Poems of Anna Wickham* (1921).

UNTERMEYER, SAMUEL (1858–). An American lawyer (see VOL. XXII). In 1916 and for several years following he was a member of the United States section of the International High Commission. He was special adviser to the government on the interpretation of income tax and war emergency tax laws and in 1922 was counsel for a legislative committee investigating the building situation in New York City.

UPSON, RALPH HAZLETT (1888–). An aeronautical engineer, born in New York City, who started lighter-than-air machine training for the United States Navy in 1914. He designed the first improved kite balloon in 1915 and developed lighter-than-air construction at Goodyear, principally kite balloons and navy airships 1917. He started the Wingfoot Lake Flying School in 1917 and flew the first navy coast patrol ship from Chicago to Akron in demonstration flight 1917. He won the National Balloon Race in 1919 and in 1921. During 1918-19 he was a member of the Navy design mission in Europe. He wrote many articles on aëronautical subjects.

URANIUM. See RADIUM.

URBAN GOVERNMENT AND POPULATION. See MUNICIPAL GOVERNMENT.

URUGUAY. The smallest of the South American republics, with an area of 72,180 square miles and an estimated population (Dec. 31, 1923) of 1,603,000. This was a gain of 53.7 per cent over the census figure of 1908, with an annual increase of 3 6 per cent. The density increased from 12.9 per square mile in 1908 to 20.7 in 1920. Montevideo, the capital, had 418,000 inhabitants in 1923 as against 291,465 in 1908. Other large cities were: Paysandu, 30,000; Salto, 30,000; Mercedes, 25,000. For the five years 1916–20, total immigration was 870,460; total emigration, 817,319. Immigrants, chiefly seasonal agricultural laborers, came from Spain, Italy, Brazil, England, France, and Germany. In 1923, 1600 such laborers entered. Education made much progress in the period 1914–24. The registration during the school year 1922–23 was 118,102 in the 1036 primary schools, as compared with 91,746 in the 976 schools of 1913. Adult schools numbered 65 in 1922 and were attended by 6533 pupils. Vocational training, in particular, was spreading. The University of Montevideo in 1922 had 1615 students. By the constitution of 1919, state and church were separated.

Industry and Trade. Under the spur of an enlightened government policy economic activity showed great advances A national agricultural college was formed, immigration was officially encouraged, and money was set aside annually, beginning with 1913, to furnish free seed to farmers. The area devoted to agriculture increased from 1,961,515 acres in 1908 to 2,681,613 in 1922. Production of wheat, corn, oats, and linseed, in particular, showed an increase. Still, 20 per cent of the total imports continued to be food products, and cattle-raising remained the leading pursuit, animals and animal products making up 95 per cent of the country's exports. In 1916 there were 7,802,442 head of cattle, 554,871 horses, 11,472,852 sheep, 16,663 mules, 12,218 goats, and 303,949 pigs. The packing industry was rapidly being developed, and by 1922 upward of 25 plants were devoting themselves to chilling, salting, and canning meats. In 1921 there were altogether 3704 industrial establishments with 36,872 workmen. The state's interest in industrial affairs in the period was evidenced by the passage of a child labor law, the regulation of hours in industry, the creation of a national insurance bank (1912), an old-age pension law (1919), etc. The Uruguayan quarries were becoming important, and granite, marble, and agate were being produced and exported. The foreign trade for the period 1912–23 showed a consistent advance until 1920, when the world-wide depression affected Uruguay too. Imports and exports for typical years were in thousands of gold pesos, 1 peso being equal to $1.034.

	1913	1919	1920	1922	1923
Imports	50,352	43,202	50,590	43,036	55,200 (Estimated)
Exports	68,496	147,251	80,751	77,458	100 786

Principal imports in 1923, in order of value, were foodstuffs, fuel, hardware, and textiles; principal exports, meat and extracts, wool, hides, agricultural produce, and live animals. By 1923, evidences were perceptible of a considerable recovery from the depression of 1920–22, when Uruguayan cattle were a drug on the market. During this period it was necessary to curb the import trade, and the domestic strain

was marked. The year 1924 saw a favorable agricultural outlook, while the packing plants were once more working to capacity. The trade figures indicate the change. In connection with the table it is necessary to note that import figures are official tariff values and represented less than half the actual values. Figures should therefore be multiplied by 2.25. From 1920 on, the trade balance was thus adverse. During the decade, the United States advanced to the forefront as the most important country in Uruguay's trade. Proportions in value by countries of origin of Uruguayan imports for 1921 were: Argentina, 13.6 per cent; Brazil, 13.8; Great Britain, 17.8; the United States, 26.5; Germany, 7.1; France, 4.7. Proportions in value by countries of destination of Uruguayan exports were: Argentina, 4.3 per cent; Brazil, 3; Great Britain, 25; the United States, 27.3; Germany, 16.7; France, 9.9. In 1923, imports from the United States were $15,077,188 and exports to it were $21,811,424. The carrying trade was carried on almost exclusively in British bottoms, and the British net tonnage surpassed the combined tonnage of American, Italian, French, German, Dutch, and Spanish ships. By 1923, two-thirds of the American shipments to Uruguay were being handled in American bottoms.

Finance. The 1922–23 budget balanced at 39,654,254 pesos; the 1923–24 called for expenditures of more than 43,000,000 pesos, anticipating a deficit of 5,000,000 pesos. The 1914 receipts were 36,597,360 pesos; expenditures, 36,516,877. Deficits were frequent during the period, that of 1921–22 being 7,000,000 pesos, and as much in 1922–23. On Dec. 31, 1922, the internal debt was 47,509,387 pesos (15,620,423 in 1913); foreign debt, 128,851,536 (118,487,935 in 1913); internal debt, 2,243,000 (2,590,500 in 1913); total, 178,603,923 pesos. On Nov. 30, 1923, the debt had risen to 187,145,068 pesos. Payments on foreign debts, suspended during the War, were resumed in 1923. Notes in circulation on Oct. 31, 1923, totaled 61,687,823 pesos with a gold reserve of 55,990,646 in all banks. The notes more than doubled those of eight years before, but the gold reserve was almost five times as large. Exchange figures were: par value of gold peso, $1.04; average rate in 1922, 123 pesos to $100.

Communications. In 1923 there were 1650 miles of railway, of which 125 miles were state-owned; the remainder was financed by British capital. There were some 700 miles of navigable waterways, largely on the Uruguay and Plate Rivers.

History. The country's prosperity continued unhampered by internal dissension under the administrations of Feliciano Vieira (1915–19) and Baltasar Brum (1919–23). The sympathies of the people were with the Allies, and on Oct. 6, 1917, following the lead of the United States and Argentina, Uruguay broke relations with Germany. The most important internal event of the decade 1914–24 was the installation of the new federal constitution (Mar. 1, 1919). By the new instrument, the executive power was divided between the president, popularly chosen for four years, who controlled the departments of the interior, foreign affairs, army, and navy, and a National Administrative Commission of nine popularly elected for six years, which controlled the departments of finance, education and industry, and public works. Minority representation was assured, based on plural voting. Congress retained the legislative power, elected the Supreme Court, passed on treaties, and was vested with the right of interpreting the constitution. Cabinet members might present bills as in England. Church and state were separated, and woman suffrage was provided for, subject to acceptance by a two-thirds majority of each house. Local autonomy was granted the 19 departments, each of which had its local government board and representative assembly. Under Presidents Brum and José Serrato, elected in 1923, progress was made in education and public works, and friendship with the United States was cemented by an increasing number of advanced students sent to American colleges. In December, 1920, United States Secretary of State Colby visited Uruguay.

UTAH. Utah is the tenth State in size (84,990 square miles) and the fortieth in population; capital, Salt Lake City. The population increased from 373,351 in 1910 to 449,396 in 1920, a gain of 20.4 per cent. The white population increased from 366,583 to 441,901. The Indian population decreased from 3123 to 2711; Chinese, from 1305 to 1137; while the Japanese increased from 2110 to 2956. The number of negroes rose from 1144 to 1446. The native white population showed an increase from 303,190 to 385,446, while the foreign-born white decreased from 63,393 to 56,455. Both urban and rural populations mounted: The former from 172,934 to 215,584; the latter from 200,417 to 233,812. The growth of the principal cities was as follows: Salt Lake City (q.v.), 92,777 in 1910 to 118,110 in 1920, Ogden, 25,580 to 32,804; Provo, 8925 to 10,303.

Agriculture. Agriculture made substantial progress in the decade 1910–20. While the population increased 20.4 per cent, the number of farms in the State increased 18.4 per cent (from 21,676 to 25,662); the total acreage in farms from 3,397,699 to 5,050,410, or 48.6 per cent; and the improved land in farms from 1,368,211 acres to 1,715,380, or 25.4 per cent. The percentage of the total area used for agricultural purposes in 1910 was 6.5 per cent, and in 1920, 9.6 per cent. The percentage of farm land improved, in 1910, was 40.3; in 1920, 34. The total value of farm property showed an apparent increase, from $150,795,201 to $311,274,728; the average value per farm, from $6957 to $12,130, or 74.4 per cent. In interpreting these values and all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 25,662 farms in 1920, 22,579 were operated by owners, 296 by managers, and 2787 by tenants. The comparative figures for 1910 were 19,762, 194, and 1720. White farmers in 1920 numbered 25,248, of whom 21,276 were native, 3972 foreign born. There were 414 colored farmers, of whom 209 were Indians. In 1910 there were 21,400 white farmers: 15,948 native; 5452 foreign born. Farms free from mortgage in 1920 numbered 10,756, compared with 15,131 in 1910. Those under mortgage in 1920 were 9916, compared with 4492 in 1910, reflecting the adverse conditions after the war. The number of dairy cows in 1920 was 80,801, compared with 75,810 in 1910; "beef cows,"

228,953, compared with 185,174; sheep, 1,691,795, compared with 1,670,800. The area under irrigation in 1909 was 999,410 acres; in 1919 the irrigated acreage was 1,371,651. The estimated production of the principal farm crops in 1923 was as follows: corn, 900,000 bushels; spring wheat, 3,510,000 bushels; winter wheat, 2,945,000 bushels; oats, 3,638,000 bushels; barley, 716,000 bushels; potatoes, 2,935,000 bushels; hay, 1,374,000 tons; sugar beets, 941,000 short tons. Comparative figures, for 1913, are: corn, 340,000 bushels; wheat, 6,420,000; oats, 4,140,000; barley, 1,155,000; potatoes, 3,600,000; and hay, 909,000 tons. The apple crop in 1909 amounted to 350,023 bushels; in 1919, to 759,696. The production of peaches increased from 143,237 bushels in 1909 to 883,950 bushels in 1919.

Mining. Utah produces large amounts of minerals, among which the chief are coal, silver, lead, and copper, coal being the most important. The progress of the mining industry is indicated by the table. In the total production of copper, Utah ranks fourth, being surpassed only by Arizona, Montana and Michigan. In production of silver Utah is first among the States. (By the terms of the Pittman Act of 1918, silver was valued at $1 an ounce.) The State also produces gold to the value of about $2,000,000 a year; as well as zinc, clay products, iron ore, and uranium and vanadium ores. The total value of the mineral products in 1921 was $40,595,872, compared with $76,536,657 in 1920; $64,165,525 in 1919; $105,785,474 in 1918, and $45 636,198 in 1914.

PRODUCTION OF COAL, COPPER, LEAD, AND SILVER IN UTAH

Year	Coal Net tons	Copper Pounds	Lead Pounds	Silver Fine Ounces
1914	3,103,036	152,034,002	171,323,137	11,154,916
1915	3,108,715	187,671,188	. . . . .	. . . . .
1916	3,567,428	240,275,222	201,490,075	13,253,037
1917	4,125,230	246,674,153	. . . . .	. . . . .
1918	5,136,825	227,169,630	167,008,224	13,455,597
1920	6,005,199	116,931,238	140,838,113	13,106,976
1921	4,078,784	[a] 30,891,403	89,187,269	. . . . .
1922	.	97,193,850	. . .	17,271,100

[a] Decreased production due chiefly to business depression.

Manufactures. Although Utah is not one of the chief manufacturing States, it has industries of great importance, chiefly related to the smelting and refining of metals. There were, in 1920, three cities in the State with more than 10,000 inhabitants. These contained 35.9 per cent of the total population, and in 1919 reported 33 8 per cent of the value of the State's manufactured products. There were in the State, 749 manufacturing establishments in 1909; 1109 in 1914; and 1160 in 1919. Persons engaged in manufacture numbered 14,133, 17,126, and 23,107; the capital invested amounted to $52,626,640, $71,843,168, and $140,785,034, in those years The value of manufactured products amounted to $61,989,277 in 1909; to $87,112,360 in 1914; and to $156,933,071 in 1919. The increase in value of products was in great measure due to the change in industrial conditions brought about by the War, and cannot be taken as an index of the increase in manufactures between 1914 and 1919; but the increase in number of persons employed clearly indicates growth in the State's manufacturing activities. Lead smelting is the most important industry in point of value of product, with a value, in 1909, of $13,170,000; in 1914, $21,752,000; and in 1919, $27,518,000. The manufacture of beet sugar is second in this respect. Statistics previous to 1919 are not available; but the figure for that year was $27,518,000. In 1919, Utah ranked fourth among the States in value of product for this industry. The principal manufacturing cities are Salt Lake City and Ogden. There were, in Salt Lake City, 245 manufacturing establishments in 1909, with a product valued at $13,351,000; 366 in 1914, with $16,663,000; and 415 in 1919, with $33,357,000. In Ogden, in 1909, there were 68 establishments, with a product valued at $3713; 110 in 1914, with $6,014,000; and 128 in 1919, with $18,150,000.

Education. The educational system of Utah has always been among the best and most efficiently administered State systems. The Legislature has been diligent in passing necessary legislation, and during the period 1913–23 many steps were taken toward further improvement. Among the important measures passed was one providing for the appointment of a person to act as State high-school supervisor and also as supervisor of vocational education. While in other States it is common for the director of vocational education to be free and quite independent of the direction of the high-school director, it is believed in Utah that the single appointment should have a tendency to coördinate the vocational with the regular work of the high school, making all phases of high-school education fit as perfectly as possible into a unified whole. The Legislature of 1921 made it possible for the State Board of Education to appoint a State primary supervisor, which greatly improved the work of the teachers and the schools. The Legislature of 1917 accepted the provisions of the Federal Smith-Hughes Law, designating the State Board of Education as the State board for vocational education; and under this law agricultural, trade, and industrial education, home economics, and teacher training were being carried on with excellent results. The compulsory education law of the State compels attendance in school until the age of 18, unless the high-school course has been completed. The total enrollment in the six lower elementary school grades in 1923 was 81,501; in the junior high schools, 29,128; in the senior high schools 8335—a total enrollment in all schools of 119,034. The average daily attendance in 1913 was 92,139. The total disbursement for educational purposes in 1921–22 was $12,039,749. The percentage of illiteracy in the State decreased from 3.1 in 1910 to 2.5 in 1920: among the native white population from 0.7 to 0.5 per cent; among the foreign-born, from 5.9 to 6.5; among the Negro, from 5.3 to 5.

Finance. For finance, see STATE FINANCES.

Political and Other Events. Political control of Utah in the decade 1914–24 changed twice. At the end of the period it had returned to the Republican party, except for a Democrat who had been elected United States Senator in 1916 and who retained his seat in the 1922 elections. In the elections of 1914, Senator Smoot was a successful candidate for reëlection on the Republican ticket, and one Representative was elected by the same party; Democrats and Progressives together elected a Representative from the first Utah district, to succeed a Republican. In 1915 the Federal government sent Gen. Hugh L. Scott to Utah to adjust a situa-

tion which threatened to start an uprising of the Piute Indians. Conditions peculiar to an "open range" country were brought to a head by the alleged murder of a Mexican by an Indian and an attempt to arrest the Indian. In 1916 the Democrats swept the State; they elected practically all county officers, the entire State ticket, headed by Simon Bamberger for governor, the two Representatives in Congress, and William H. King as United States Senator. Senator King succeeded Senator George Sutherland, now Justice of the Supreme Court of the United States. In the presidential voting of this year, President Wilson received 84,025 votes; Charles E. Hughes, 54,136. State elections were again held in 1920. The Republicans again came into power and elected their candidate for governor, Charles R. Mabey, said to be the first veteran of the War to hold the office of chief executive in any State. Senator Smoot was reëlected. In the presidential election, Warren G. Harding received 81,555 votes; James M. Cox, 50,639. In 1922 Senator King, Democrat, was reëlected to the Senate, although the State generally went Republican, and both Republican Congressmen were reëlected. The Republican State convention held in May, 1924, pledged the 11 delegates of the State to the national convention to President Coolidge.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. The Legislature of 1915 enacted a State-wide prohibition law; this, however, was vetoed by the governor. A second law was enacted, modeled after the Webb-Kenyon law and enforcing heavy penalties for its infraction. In 1917 the Legislature created a State budget system, passed a workmen's compensation act and a cold storage act, created a public utilities commission, passed a corrupt practices act and an initiative and referendum act, and amended various laws relating to the State government. It also passed a stringent State-wide prohibition law, which went into effect in August, 1917. An amendment providing for constitutional prohibition was proposed by the Legislature and was voted into the constitution by the people in the State election of 1919. The Legislature of 1919 passed statutes defining and punishing criminal syndicalism and sabotage and created a State securities commission. In 1921 the Legislature passed a long series of bills with the common purpose of remodeling the State government and increasing its efficiency. In 1923 laws were passed allowing suspension of sentence on the conviction of any crime or offense in which suspension appeared to the court compatible with the public interest, the defendant in such a case to be put on probation. A measure was also passed to facilitate coöperative marketing of agricultural products, and provisions were made for creating associations for this purpose.

UTAH, UNIVERSITY OF. A coeducational State institution at Salt Lake City, Utah, founded in 1850. The student enrollment increased from 944 in 1913–14 to 2500 (estimated) in 1923–24, the faculty increased from 80 to 171 members and the library from 38,757 volumes to 71,107 bound volumes and 29,107 pamphlets. The income of the university during the same period was increased from $250,000 to $563,500. James McGregor of Terre Haute, Ind., gave $50,000 in 1918 to endow the Schools of Mines and Engineering, and in the following year a building for the Medical School, a dining hall, Stewart Hall and an observatory were built. John A. Widtsoe, LL.D., succeeded J. T Kingsbury, Ph.D., D.Sc., as president in 1916, and was succeeded in turn by George Thomas, Ph.D., in 1921.

UTICA. A city of New York. The population increased 26 per cent from 74,419 in 1910 to 94,156 in 1920 and to 103,457 by estimate of the Bureau of the Census for 1923. With the opening of the New York State Barge Canal, the old Erie Canal fell into disuse, and in 1921 the city built a conduit for water and a roadway over the site of the canal, thus eliminating the old bridges on the main streets. The cost of the work was about $150,000. The Marcy division of the Utica State Hospital for the Insane was under construction in 1924, of which several units of buildings were completed It was to cost the State more than $10,000,000 by the time it was finished. The park system of the city was expanded during the period, at a large outlay.

V

VACUUM TUBES. See RADIO TELEGRAPHY.

VAIL, THEODORE NEWTON (1845–1920). An American capitalist (see VOL XXII). When the telegraph and telephone systems were taken over by the government in 1918, the Postmaster General appointed him as adviser, and when private operation was resumed in 1919, he was made chairman of the board of directors of the American Telephone and Telegraph Company. He died in Baltimore in 1920, leaving an estate of about $2,000,000

VALENTINER, WILHELM R (1880–). A German art historian (see VOL. XXII). In Germany at the outbreak of the War, he enlisted in the army and took part in the entire struggle On the entry of the United States into the War he resigned his position as curator of decorative art in the Metropolitan Museum of New York City Following the War he frequently visited the United States and became European adviser to the Detroit Museum. He wrote catalogues of important American collections, such as the Johnson and Widener in Philadelphia and that of Henry Goldman in New York (1922). His most important recent work is *Rembrandt van Rijn: Wiederfundene Gemalde* (Stuttgart, 1921).

VALONA. See ALBANIA.

VANDERBILT, CORNELIUS, III (1873–). An American capitalist, born in New York City, and educated at Yale University. He was a director in many important financial institutions in New York and elsewhere. He was for many years connected with the State Militia of New York and in 1917 was commissioned colonel in command of the 102d United States Engineers, with which regiment he served in France. In 1918 he was commissioned brigadier-general in the National Army and later brigadier-general in the Officers Reserve Corps.

VANDERBILT UNIVERSITY. A coeducational institution at Nashville, Tenn., founded in 1873. The student enrollment increased from 1112 in 1914 to 1300 in 1923–24. The number of members in the faculty was likewise increased during the decade from 125 to 150, and the library from 53,000 to 83,000 volumes. A million dollars was added to the endowment in 1918, of which $725,000 came from the Vanderbilt family and the General Education Board. In 1919 the General Education Board gave $4,000,000 for the School of Medicine, and in 1921 an additional appropriation of $1,500,000 was made by the General Education Board and a like amount by the Carnegie Corporation. These gifts were for the purpose of building a new medical plant on the main campus of the university and for reorganizing the School of Medicine. Building operations under this arrangement were begun in 1923, to be completed in 1925. James H. Kirkland, Ph.D., LL.D., succeeded Henry B. Brown as chancellor in 1916.

VANDERLIP, FRANK ARTHUR (1864–). An American financier and writer (see VOL. XXIII). During the War he was chairman of the War Savings Committee. In 1920 he visited Japan and on his return wrote many articles in regard to Japanese-American relations. Also in 1920, his book, *What Happened to Europe*, appeared. In 1924 he organized the Citizens' Federal Research Bureau to investigate graft in government circles and took out a $1,000,000 insurance policy on his life in its favor.

VAN DOREN, CARL (1885–). An American editor and author, born at Hope, Ill., and educated at the University of Illinois and Columbia University. After several years on the faculty of the University of Illinois, he was appointed instructor in English at Columbia in 1911 and became assistant professor in 1914 and associate in English in 1916. From that year to 1919 he was headmaster of the Brearley School and in 1919 became literary editor of *The Nation*. Later he joined the staff of *The Century Magazine* Besides editing selections from the works of American writers, he wrote *The Life of Thomas Love Peacock* (1911), *The American Novel* (1921); and *Contemporary American Novelists* (1922); *The Roving Critic* (1923); *Many Minds* (1924).

VAN DYKE, HENRY (1852–). An American author and diplomat (see VOL. XXIII). He resigned his post as United States Minister to the Netherlands and Luxemburg in 1917, and when America entered the War he served as a chaplain in the Navy. His later books include *Fighting for Peace* (1917); *The Red Flower* (1917); *The Valley of Vision* (1919); *Golden Stars* (1919); and *Camp Fires and Guide Posts* (1921); *Companionable Books* (1922).

VAN DYKE, JOHN CHARLES (1856–). An American art historian (see VOL. XXIII). After 1914 he published a large number of critical handbooks of the great European galleries, with original and stimulating comments on the paintings. His publications include also *American Painting and Its Tradition* (1919) and *Rembrandt and His School* (1923). In the latter he endeavors to prove that only about 50 of the thousand pictures which he claims are ascribed to Rembrandt are genuine; the remainder, according to his theory, are by pupils of Rembrandt. For example, of the many Rembrandts in the Metropolitan Museum, New York City, not one is genuine, Van Dyke believes. This book made a great sensation, but its conclusions were not generally accepted.

VANE, SUTTON (?–). An English dramatist. During the War he served in Egypt, was shell-shocked, and was invalided home in 1917. After producing several unsuccessful plays he wrote, in 1923, *Outward Bound*. For this he hired a small playhouse, painted the scenery himself, and engaged a fine company of actors on a coöperative basis, with his wife

in the principal rôle. The initial cost was only $600, but success was instant and complete. The play was produced both in London and New York during 1924.

VAN GORDON, CYRENA (1893–). An American dramatic mezzo-soprano, born at Camden, Ohio. After completing her studies under Louise Dotti at the Cincinnati College of Music, she made her début with the Chicago Opera Association as Amneris in *Aida* (Nov. 23, 1913) with such success that she was engaged as a regular member. She then became one of the principal stars of the company. A splendid singer and superb actress, she is equally convincing in German, French, and Italian rôles. Her Wagnerian repertoire is especially varied, including Venus, Ortrud, Brangäne, Erda, Flosshilde, Fricka, and Brünnhilde (*Walkure*). In 1912 she married Dr. Shirley B. Munns.

VAN HOOGSTRATEN, WILLEM (1880–). A Dutch conductor, born at Utrecht. For six years he studied the violin under Eldering at the Cologne Conservatory, at the same time playing in the Gürzenich Orchestra under such conductors as Steinbach, Nikisch, and Mahler. After further study under O. Ševčik at Prague he began his career as a virtuoso, making tours of Germany. A most successful début as conductor, in Hamburg, was followed by appearances as guest conductor in other German cities, in Sweden, and in Holland From 1914 to 1917 he was conductor of the Städtisches Orchester in Crefeld, where he also formed a trio with his wife, Elly Ney (q.v.), whom he had married in 1911, and Fritz Reiss ('cello). At his American début with the Philharmonic Society (New York, Jan. 2, 1922), in an all-Brahms programme, he made a deep impression, which was even heightened at his second concert two weeks later. As a result he was engaged to conduct the second half of the society's summer concerts at the Stadium of the College of the City of New York in 1922, when his brilliant performances attracted record audiences. The following summer, as sole conductor of the series, he repeated his triumphs. In the fall of 1923 he appeared as regular conductor of the winter series, succeeding Stransky, and alternating with Mengelberg (q.v.).

VAN LOON, HENDRIK WILLEM (1882–). An American author and lecturer, born at Rotterdam, Holland, and educated at Cornell, Harvard, and Munich Universities. During the revolution in Russia in 1906 he went to Moscow, St. Petersburg, and Warsaw as war correspondent. He lectured on history at several universities in the United States from 1911 to 1914. When the War broke out he went to Belgium and reported the siege of Antwerp for the Associated Press. The Germans expelled him from Belgium in December, 1914. He lectured on modern European history at Cornell during 1915 and 1916 and later accepted the chair of history at Antioch College. He wrote: *The Fall of the Dutch Republic* (1913); *The Rise of the Dutch Kingdom* (1915); *The Golden Book of the Dutch Navigators* (1916); *A Short History of Discovery* (1918); *Ancient Man* (1920); *The Story of Mankind* (1921); *The Story of the Bible* (1923).

VAN PELT, JOHN VREDENBURG (1874–). An American architect, born at New Orleans. He studied art and technical education in Paris and from 1897 to 1900 was assistant professor of architecture at Cornell University. After several years spent in travel abroad he became professor of design and dean of the College of Architecture in 1902, but resigned two years later. After 1904 he practiced in New York. From 1904 to 1913, he was associate director of the Atelier of Columbia University, and from 1914 to 1917, professor of architecture at the University of Pennsylvania. He received many medals for the excellence of his designs and plans and was the author of *Essentials of Composition as Applied to Art* (1902).

VAN'T HOFF ISOCHORE. See CHEMISTRY, PHYSICAL.

VAN VECHTEN, CARL (1870–). An American author, born at Cedar Rapids, Iowa, and educated at the University of Chicago. He became assistant musical critic of the New York *Times* in 1906 and that newspaper's Paris correspondent in 1908. He edited the programme notes of the Symphony Society of New York (1910–11) and was dramatic critic for the New York *Press* (1913–14). He wrote: *Music After the Great War* (1915); *Music and Bad Manners* (1916); *Interpreters and Interpretations* (1917); *The Merry-Go-Round* (1918); *The Music of Spain* (1918); *In the Garret* (1920); *A Letter by Morgan Lewis Fitch* (1920); *Interpreters* (1920); *The Tiger in the House* (1920); *Lord of the Housetops* (1921); *Peter Whiffle, His Life and Works* (1922); *The Blind Bow-Boy* (1923); *The Tattooed Countess* (1924).

VAN VLIET, CORNELIUS (1886–). An American 'cellist, born at Rotterdam in Holland At the age of six he received his first instruction on the piano and the violin from his father In 1895 he began to study the 'cello with O. Eberle in Rotterdam and later continued with J. Mossel in Amsterdam. In 1901 he joined the Concertgebouw Orchestra in Amsterdam In 1903 he was solo 'cellist of the Leipzig Philharmonic Orchestra, in 1904 of the Prague Philharmonic Orchestra, and in 1905 of the Helsingfors Symphony Orchestra. He also taught in Helsingfors, at the conservatory. From 1905 to 1908 he was solo 'cellist of the Kaim Orchestra in Munich and in 1908–11, of the Royal Opera in Vienna. In 1911 he came to America on a concert tour. From 1912 to 1919 he was solo 'cellist of the Minneapolis Symphony Orchestra and a member of the Minneapolis Trio He then moved to New York, where in 1921 he became solo 'cellist of the Philharmonic Society, jointly with Leo Schulz. In 1919 he formed with Scipione Guidi (violin) and Clarence Adler (piano) the New York Trio.

VAQUEZ, HENRI (1860–). One of the leading physicians of France, known especially in connection with diseases of the heart, circulation, and blood. Several years after his graduation from the University of Paris he described a new disease of the blood, polycythemia, known also as Vaquez's disease. One of his earliest publications was *Hygiène des Maladies du Cœur.* With the exception of his *Précis de Thérapeutique* (1907), all his major works have been concerned with heart disease: *Les Arythmiés* (1911); *Le Cœur et l'Aorte,* on radiology of the heart, in collaboration with Bordet (1913); *Radiologie des Vaisseaux de la Base du Cœur,* also with Bordet (1920); *Maladies du Cœur* (1921); *Appareil Circulatoire,* in collaboration (1922). His work on radiology of the heart also appeared in English translation. Vaquez is edi-

tor of the periodical *Archives des Maladies du Cœur.*

VARIATION. See HEREDITY.

VASSAR COLLEGE. A nonsectarian institution for women at Poughkeepsie, N. Y., founded in 1861. The student enrollment in 1914 was 1120 as compared with 1146 in 1923–24, the faculty numbered 121 at the beginning of the decade and 154 at the end, the library was increased from 86,000 to 127,078 volumes, and the productive funds of the college from $1,655,257 to $5,143,081. New admission requirements were set in 1919 to take the place of the old method of admission by certificate from approved schools and colleges. The new requirements took the form of comprehensive examinations in four general subjects as well as a satisfactory school record of the candidate, and could be replaced at will by the old examinations in individual subjects. James W. Taylor resigned from the presidency in 1914, and was succeeded by Henry Noble McCracken, Ph.D.

VATICAN. See ROMAN CATHOLIC CHURCH.

VAUGHN, SAMUEL JESSE (1877–). An American educator, born in Elkton, Mo., and educated at Drury College, Mo., and the University of Chicago. He was director of industrial education at several schools in Illinois until 1921, when he was chosen president of Hardin College. In 1914 he was editor of the *Industrial Arts Magazine.* During the War he served in the Sanitary Corps. He is the author of *Printing and Bookbinding for Schools* (1912) and *Content and Methods of the Industrial Arts* (1922). He lectured much on educational, social and economic problems.

VEATCH, ARTHUR CLIFFORD (1878–). An American geologist, born at Evansville, Ind., and educated at Indiana, Cornell, and Wisconsin Universities. Meanwhile he taught mathematics and physical geography at the Rockport (Ind.) High School, and was assistant State Geologist of Louisiana (1898–1900). In 1902 he became assistant geologist with the United States Geological Survey and from 1906 to 1910 held the rank of geologist, after which he was chief geologist of the General Asphalt Company for a year. He then accepted control of the foreign petroleum developments of S. Pearson and Sons of London. During 1919 he became connected with the Sinclair Consolidated Oil Corporation, in charge of the exploration department. He is a member of the American Institute of Mining and Metallurgical Engineers, on whose petroleum committee he served after 1919, and in 1921 he became chairman of its subcommittee on foreign oil policy. In addition to numerous articles and reports he is the author of *Quito to Bogota* (1917).

VEBLEN, THORSTEIN B. (?–) An American economist (see VOL. XXIII). In 1918 he came to New York City as a teacher at the New School for Social Research. Among his later publications are: *An Inquiry into the Nature of Peace and the Terms of Its Perpetuation* (1917); *The Higher Learning in America* (1918); *The Vested Interests* (1919); *The Place of Science in Modern Civilization and Other Papers* (1920); *The Engineer and the Price System* (1921).

VENETIA JULIA. See FIUME-ADRIATIC CONTROVERSY

VENEZUELA. A republic on the north coast of South America with an estimated area of 393,976 square miles. The census of December, 1920, gave the population as 2,411,952, an increase of only 88,425 or 3.8 per cent over the official census of 1910. Gains from immigration were negligible; in the three years 1919–22, for instance, the arrivals were 33,697 and the departures 33,914. Populations of the important towns in 1920 were: Caracas, the capital, 92,212; Maracaibo, 46,706; Valencia, 29,466; Barquisimeto, 23,943; San Cristobal, 21,385. After 1913 great administrative activity in the field of education was evident; in 1914 primary education was made free and compulsory; in 1915 vocational and art schools were provided for; in 1916 schools of pharmacy and dentistry were established. At Caracas, the Central University was reopened in 1922 after a lapse of 10 years.

Industry. Agricultural, pastoral, and woodland products remained the leading factors in the country's economic life. Coffee was first in importance, with some 500,000 acres under cultivation in 1922 on 25,000 plantations, with an average annual production of 69,000,000 kilos valued at $30,000,000. The annual production of cocoa was about 20,000 metric tons; of sugar about 60,000. Cattle, sheep, and goat raising remained important, and in the years 1915–22 the herds and flocks showed increases. The live stock in 1922 was estimated at 2,800,000 steers, 115,000 sheep, 2,150,000 goats, 168,000 horses, 255,000 mules and asses, and 500,000 pigs. Gold, petroleum, copper, salt, and asphalt were the leading mineral resources. From leases, etc., the government derived an annual revenue of some 3,400,000 bolivars in royalties. In later years petroleum was mined in increasing quantities. The oil wells, principally in the Maracaibo district, were worked by American and British interests In 1919, production was 45,000 metric tons; in 1920, 69,539; in 1921, 218,146; in 1922, 285,673. Something of Venezuela's progress during the period 1914–24 may be adduced from export values for typical years:

	Values in United States Currency			
	1913	1919	1920	1921
Coffee	$16,196,657	$29,225,714	$12,698,246	$12,373,552
Cacao	4,854,734	7,543,708	6,731,685	3,972,348
Balata	2,032,868	1,255,365	1,669,730	988,504
Hides	1,439,179	2,742,847	1,478,880	200,000
Total exports	$29,483,789	$49,922,959	$32,934,322	$25,777,057
Total imports	18,030,103	34,208,047	58,330,369	18,433,114

Imports from the United States in 1914 were valued at $6,082,000; in 1923 they were worth $11,918,570. Proportions of the export value by countries of destination for 1913 and 1921 were: the United States, 28 and 40 per cent; Great Britain, 7 and 10 per cent; Germany, 19 and 4; France, 34 and 10; Spain, 5 and 11; the Netherlands, 3 and 20. Proportions of import value by countries of origin for 1913 and 1921 were: the United States, 40 and 55 per

cent; Great Britain, 22 and 16; Germany, 14 and 4; France, 5 and 8; Spain, 4 and 3; the Netherlands, 10 and 5; Italy, 3 and 2.

Finance. Government finances in the period 1914–24 steadily improved, revenues showing surpluses over expenditures for all the years except four. In 1914 revenues were 67,414,974 bolivars; expenditures, 72,278,987 The 1923–24 budget balanced at 62,845,000 bolivars. The condition of the debt also became more favorable. In January, 1914, the internal debt amounted to 61,607,179 bolivars In December, 1923, it had been reduced to 41,603,245 bolivars. Similarly, in 1914 the foreign debt was 114,-853,071 bolivars; in 1923, 67,122,880. Amortizations and cancellations effected during the 15 years between January, 1909, and December, 1923, had been 126,232,740 bolivars. On Apr. 15, 1923, the Treasury reserves amounted to 48,000,000 bolivars. In 1922 notes in circulation were 39,085,000 bolivars.

Communications. In 1922, 661 miles of railway were in operation, a gain of 121 miles over 1914. The greatest activity was manifested in road building. In 1915 and 1916 plans were made for the construction of two great highways, the Gran Carretera Oriental (626 miles) and the Gran Carretera Occidental (540 miles), and the work was immediately begun. In 1923 extensions of these roads were announced.

Defense. By a law promulgated in 1920, service in the army was made compulsory for two years in the active forces and up to the age of 45 in the reserve.

History. After 1914, internal affairs remained orderly. The chief concerns of the government were the readjustments necessary to meet war conditions. Venezuela maintained her neutrality throughout the War and on Mar. 3, 1920, joined the League of Nations. Gen. Juan Vicente Gómez continued as president, holding the office uninterruptedly since 1909, although for a time he relinquished the post to a provisional president to act as commander-in-chief. In 1922 he was reëlected for the next seven years' term. The long-standing boundary dispute with Colombia was, as a result of a convention signed in 1916, first submitted to the Swiss President as arbiter, and then to the Swiss Federal Council. On Mar. 24, 1922, it was announced that a decision had been reached, although the terms were not made public by 1924. On June 30, 1923, the first vice president of the republic, Juan C. Gómez, brother of the president, was murdered in the palace at Caracas, as a protest against the nepotism practiced by the administration. On the other hand, in justification of the Gómez régime, it was pointed out that the country remained peaceful, foreign capital in the oil fields was steadily being invested, the public debt was reduced, and the bolivar consistently remained at par As for the debt, the figures indicated that the diplomatic debt of 1905, which amounted to £5,229,700 originally, had been reduced to £2,794,380 by 1922

VENIZELOS, ELEUTHERIOS (1864–). A Greek statesman (see VOL. XXIII). In 1916 he established a so-called Provisional Government of National Defense at Saloniki and gathered a volunteer army of 60,000 men. His government was recognized by England, France, and Russia, and when Constantine was dethroned, Venizelos returned to Athens, took control of Greece, and declared war against Germany and her allies (1917). He represented Greece at the Peace Conference, where he achieved brilliant results for his country, but an attempt was made on his life. In the fall elections (1920) he was overwhelmingly defeated; this was attributed to German propaganda. He came to the United States in 1921. Urged to return to Greece, he demanded the abdication of Constantine as a condition. He finally arrived in Athens in January, 1924. He favored a plebiscite on the question of a monarchy or republic, formed a cabinet, and was named president of the National Assembly. Ill health compelled him to decline the premiership of the new republic, but it had his hearty support.

VENTILATION OF TUNNELS. See TUNNELS.

VERBRUGGHEN, HENRI (1874–) A British conductor, born at Brussels. He studied the violin under Hubay and Ysaye at the Conservatoire there (1887–92). In 1893 he became a violinist in the Scottish Orchestra at Glasgow, played a season in the Lamoureux Orchestra in Paris (1894–5), and returned to his former post in Glasgow. During the summers of 1895–97 he was concertmaster and assistant conductor of Rivière's Orchestra in Llandudno, Wales, and in 1898–1902, conductor of the summer concerts at Colwyn. In 1903 he settled in Glasgow as concertmaster of the Scottish Orchestra and director of the orchestral and chamber music classes at the Athenæum; in 1911 he assumed also the conductorship of the Glasgow Choral Union. In 1903 he founded, with J. Cullen, D Nichols, and J. Messeas, his own string quartet, which soon became famous. In 1915 he moved to Sydney, Australia, where he organized the National Conservatory and founded the State Orchestra, with which he gave regular series of symphony concerts in Sydney, Melbourne, Brisbane, and Adelaide, besides making an annual tour of New Zealand, thus totaling about 150 concerts a year. In 1918 he visited the United States, primarily for the purpose of studying American methods of instruction. He appeared successfully as guest conductor of some of the great American orchestras. In 1921 he returned to conduct several concerts of the Minneapolis Symphony Orchestra, of which he was appointed regular conductor in 1922.

VERDUN, BATTLES OF. See WAR IN EUROPE, *Western Front.*

VERMONT. Vermont is the forty-second State in size (9564 square miles) and the forty-fourth in population; capital, Montpelier. Vermont is one of the few States which showed a decrease in population in the decade 1910–20, when the population fell from 355,956 to 352,-428, a loss of 1 per cent. The white population decreased from 354,298 to 351,817; the negro, from 1621 to 572. The number of native whites rose from 304,437 to 307,291; foreign-born whites decreased from 49,861 to 44,526. The urban population mounted from 98,917 to 109,976, while the rural population fell from 257,039 to 242,452. The only important cities are Burlington and Rutland. The former increased from 20,468 in 1910 to 22,779 in 1920, and the latter from 13,954 to 14,954.

Agriculture. In common with the other New England States, Vermont showed a considerable falling-off in all phases of agriculture of the decade 1910–20. While the population of the State decreased 1 per cent in the decade

1910–20, the rural population decreased from 77 9 per cent in 1900, 72.2 per cent in 1910, to 68.8 per cent in 1920. The number of farms decreased 11.1 per cent (from 32,709 to 29,075); the acreage in farms, from 4,663,577 to 4,235,811, or 9.2 per cent. The improved land in farms, however, increased from 1,633,965 to 1,691,595 acres, or 3.5 per cent. The percentage of total land area used for agricultural purposes decreased from 79.9 in 1910 to 72.5 in 1920; the percentage of farm land improved increased from 35 to 39.9 per cent. The total value of farm property showed an apparent increase, from $145,399,728 to $222,736,020 or 53.2 per cent; the average value per farm, from $4445 to $7661. In interpreting these values and indeed all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 29,075 farms in 1920, 25,121 were operated by owners, 568 by managers, and 3386 by tenants. The corresponding figures for 1910 were 28,065; 636, and 4008. White farmers in 1920 numbered 29,047, of whom 25,280 were native and 3767 foreign-born. White farmers in 1910 numbered 32,689: 28,968 native, and 3721 foreign-born. Farms free from mortgage in 1920 numbered 12,132; those under mortgage, 12,225. In 1910 farms free from mortgage numbered 14,851; those under mortgage, 13,140. The number of dairy cows in 1920 was 345,643, as compared with 265,483 in 1910, and reflecting the increased attention given to dairying. "Beef cows" numbered 4242, as compared with 27,612; sheep, 62,756, as compared with 84,360. The estimated production of the principal farm crops in 1923 was as follows: corn, 3,157,000 bushels; spring wheat, 184,000; oats, 3,101,000; barley, 310,000; potatoes, 3,031,000: hay, 1,331,000 tons, and apples, 784,000 bushels. Comparative figures for 1913 are: corn, 1,665,000 bushels; oats, 3,081,000; barley, 384,000; potatoes, 3,175,000; and hay, 1,280,000 tons.

Mining. Vermont has no metal mining; the only mineral products of importance are stone, slate, lime, and talc. In the production of stone in 1920, it ranked third, surpassed only by Pennsylvania and Ohio. In 1914 the value of the stone produced was $6,635,477; 1916, $5,729,676. 1918, $5,505,895; 1920, $10,065,759; 1921, $7,322,843. The total value of the mineral products of the State in 1921 was $10,650,213, compared with $15,008,894 in 1920; $11,728,052 in 1919; $9,158,945 in 1918; and $8,665,867 in 1914.

Manufactures. Although Vermont is one of the smallest States in population and area, it has considerable industrial importance. There were in the State in 1920 three cities with more than 10,000 inhabitants. These contained 13.5 per cent of the total population and in 1919 reported 20.6 per cent of the State's manufactured products. There were in the State, in 1909, 1958 manufacturing establishments; in 1914, 1772; and in 1919, 1790. Persons engaged in manufacture numbered 38,580, 37,217, and 38,845; and the capital invested amounted to $73,470,107, $70,846,775, and $134,314,391, in those years. The value of manufactured products was $68,309,824 in 1909; $76,990,974 in 1914; and $168,108,072 in 1919. The large increase in value of products from 1914 to 1919 was largely due to the change in industrial conditions brought about by the War and cannot properly be used to measure the growth of manufactures during the period.

Marble and stone work is first among the industries in value of product. This amounted in 1909 to $12,395,000; 1914, $12,605,000; and 1919, $17,426,000 Woolen and worsted goods rank second in this respect, with $4,497,000 in 1909; $4,635,000 in 1914; and $17,426,000 in 1919. The manufacture of paper and wood pulp, in third place, amounted in 1909 to $3,902,000; 1914, $4,776,000; and 1919, $10,863,000. Butter, cheese, and condensed milk were fourth in value: $8,112,000 in 1909; $8,696,000 in 1914; and $18,539,000 in 1919 The most important manufacturing cities are Barre, Burlington, and Rutland.

Education. Educational development in Vermont in the decade 1914–24 was marked by many important legislative and administrative measures. Especial attention was given to the training of teachers High school training or normal courses, established throughout the State in 1912, were opened to high school seniors or graduates, and have graduated nearly 2500 elementary teachers. The Legislature of 1921 enacted a new law under which the State Board of Education established three two-year teacher-training or normal courses, at the University of Vermont and Castleton and Lyndon Institutes. A director of teacher training was employed and special efforts were made to enroll a large number of prospective teachers; over 420 students were entered in all courses in that year, as compared with 280 in the year preceding. In 1922 the standard of admission for all classes was raised to high school graduation. The growth in number of trained teachers had been very encouraging. The Legislature of 1923 changed the law relating to the supervision of schools in several important particulars. The local support of schools increased greatly during the decade. Special efforts were made to improve rural school conditions: to better the quality of supervision, training of teachers, buildings, and the health and physical vigor of the children. Vocational work was carried on under the provisions of the Smith-Hughes Act after 1917. The total enrollment in the public schools in 1913 was 64,825; in 1922 it was 63,439. In the high schools in the latter year there were enrolled 9748 pupils, and the total expenditure for schools was $4,014,747. The percentage of illiteracy in the State decreased from 4.6 in 1910 to 3.8 in 1920; in the native white population, from 0.9 to 0 6 per cent; in the foreign-born white, from 15.4 to 16.4; in the negro, from 13.3 to 7.7.

Finance. For finance, see STATE FINANCES.

Political and Other Events. The State, always steadily Republican, remained in the political control of that party in the decade 1914–24. In 1914 elections were held for governor, United States Senator, and Representative in Congress. Senator Dillingham was reëlected, and C. W. Gates, Republican candidate, was elected governor. The Republicans also elected a majority of the members of the State Legislature. During this year a commission carried on a survey of the educational system. In accordance with the constitutional amendment adopted by the people, the State courts were reorganized. In 1916 Horace F. Graham, Republican candidate for governor, was elected, to-

gether with the entire State ticket. At this election a prohibition amendment was defeated, while an amendment providing for a direct primary law was adopted Carroll S. Page was reëlected to the United States Senate. By the amended State constitution, the elections formerly held in September were held in November of this year for the first time. In the presidential voting of this year, Charles E Hughes received 40,250 votes; President Wilson, 22,708. By the purchase of an additional tract of 200 acres of land on the east side of Mt. Mansfield, the Mansfield State Forest was increased, in April, 1916, to a total area of 5000 acres. In 1918 a Republican candidate for governor, P. W. Clement, was elected. In the elections of 1920, James Hartness, Republican candidate for governor, was elected, and Senator Dillingham was reelected to the Senate. In the presidential voting of this year, Warren G. Harding received 68,212 votes; James M Cox, 20,919 Redfield Proctor, Republican candidate, was elected governor in 1922, and Frank L. Greene, Republican, was elected to the United States Senate. Senator Page was not a candidate for reelection. Governor Proctor was inaugurated on Jan 4, 1923. In his inaugural address he advocated the abolition of the State Board of Control and the consolidation of the various departments. Senator Dillingham died in 1923, and Porter H. Dale, Representative in Congress, was elected to succeed him on November 6 of that year.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. In 1915 the State Senate passed a measure extending the franchise to women in towns and city elections and for presidential electors. This was defeated in the House. The Legislature voted to submit to the people a prohibition law at the election of 1916. This law, as noted above, was defeated. The Legislature, in 1917, repealed the prohibition act of 1915. Amendments were made to the child labor laws, and an accounting system in the administration of State business was created. Women taxpayers over 21 years of age were permitted to vote in town meetings The Legislature of 1919 legalized absentee voting and passed several acts for the relief of agriculture, including provision for a farm census. A teachers' retiring system was established, and the laws relating to corporations, banks, common carriers, and insurance companies were amended. A measure was passed forbidding the display of the red flag in public except under certain conditions. In 1921 provision was made for planning commissions in cities, towns, and villages. A direct primary law was amended; presidential primary laws were repealed; provision was made for the regulation of workmen's compensation insurance, and it was provided that no person should be debarred from public service on account of sex. A measure was also passed proposing to give women equal suffrage rights with men

VERMONT, UNIVERSITY OF. A coeducational State institution at Burlington, Vt., founded in 1791. The student enrollment increased rapidly from approximately 600 in 1914 to 1157 in the year 1923–24, with 554 in the summer session of 1923, the faculty rose from 100 to 152, and the library from 90,000 to 115,000 volumes The income was correspondingly increased during the period, from $210,000 to $477,155, and the productive funds from $943,423 in 1916 to $1,092,014 in 1923–24. Guy Winfred Bailey, LL.D., succeeded Guy Potter Benton, D.D., LL.D., as president in 1919.

VERSAILLES, PEACE OF. See PEACE CONFERENCE AND TREATIES.

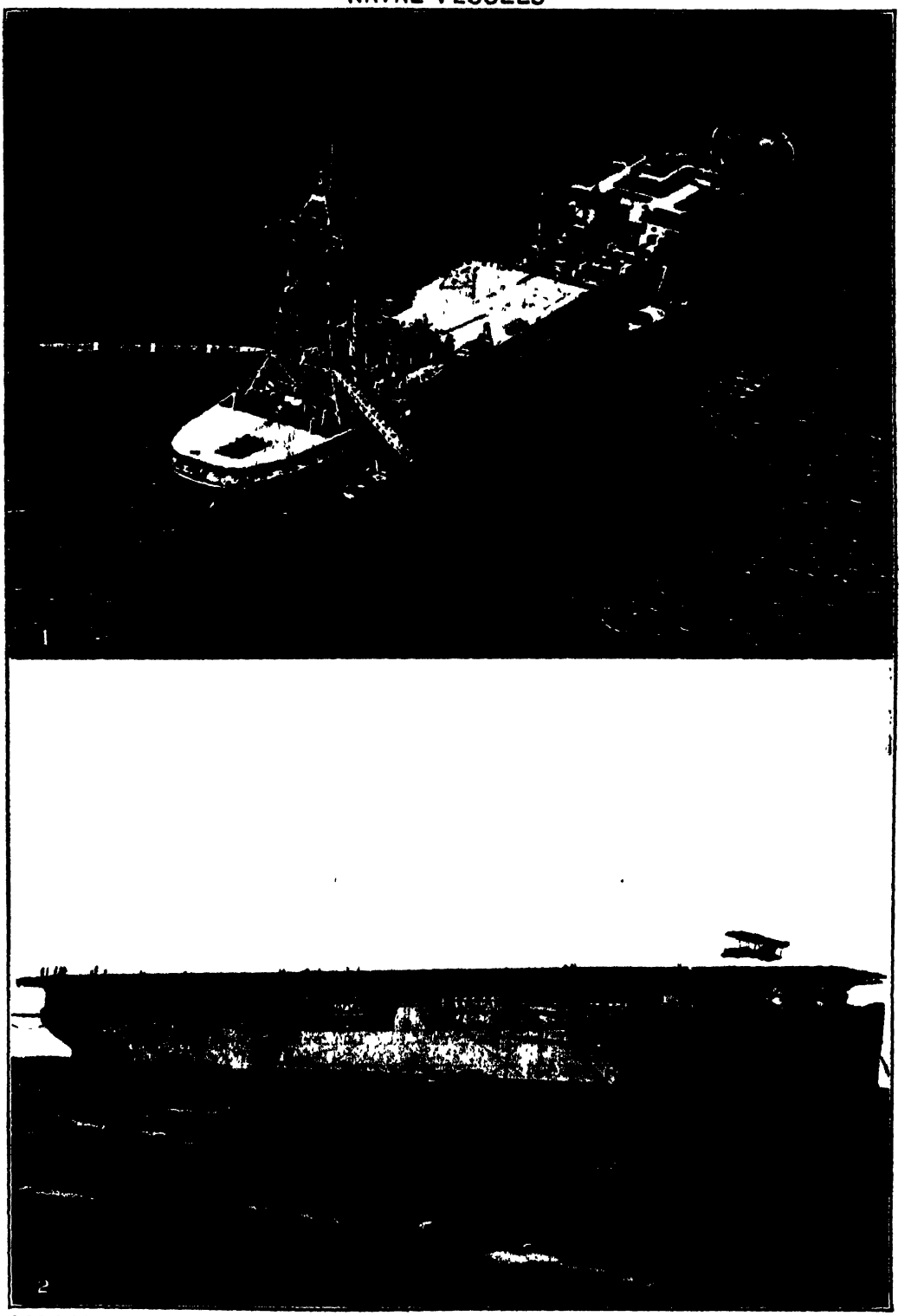
VESSEL, NAVAL. The general effect on naval shipbuilding of the Five-power Pact for the Limitation of Armaments was shown by an increase in number of vessels in those classes of which the total tonnage was unlimited, while the new ships were nearly all of the maximum size permitted. Japan, especially, increased the number of her cruisers, submarines, and destroyers, while Japan, France, and Great Britain were planning to build light cruisers of the maximum size permitted, 10,000 tons. France and Italy were building large flotilla leaders, and both, particularly the former, were adding to their destroyer flotillas. The United States Navy Department asked Congress for additional cruisers and large submarines. In the following notes the types of naval vessels existing in 1924 are briefly described.

Aircraft Carriers. These were designed not only to transport aircraft and aircraft supplies but to furnish a long, broad deck, clear of obstructions, from which airplanes and seaplanes could take off and on which airplanes and seaplanes fitted with landing-gear could make a landing Aircraft tenders of less than 10,000 tons were not classed as carriers by the Five-power Pact, which defined carriers as vessels, not capital ships, of over 10,000 and less than 27,000 tons, the maximum size allowed. The landing and taking-off deck is a light deck 7 to 30 feet above the ordinary upper deck. In some late designs it was somewhat broader than the beam of the vessel, especially at bow and stern, and was absolutely clear of all obstruction to the free passage of planes All masts, derricks, and smoke pipes were carried up at the sides of the vessels, and these were hinged so that they might be folded down to allow airplane wings to extend beyond the edge of the deck when the weather made landing difficult The design of aircraft carriers and tenders in 1924 was still in its infancy, and improvements in many directions were anticipated.

Armored Cruiser. This is a type of war vessel which was obsolete, although many were in existence in 1914. It was designed to meet and destroy the protected cruisers of the enemy In addition to light armor (3 to 8 inches) it carried heavier guns than most protected cruisers and had at least equal speed The battle cruiser is its development in one direction and the large light cruiser in another.

Armored Ship. Any ship carrying armor, but especially one carrying heavy armor, was known as an armored ship. See *Battleship, Battle Cruiser, Armored Cruiser, Monitor,* etc.

Battle Cruiser. The battle cruiser differs from a battleship only in having a much higher speed and much thinner armor. The guns of the main battery are of the same calibre and power but may be fewer in number. Great Britain and Japan are the only countries possessing battle cruisers at present. In accordance with the terms of the Five-power Pact, the United States scrapped six of this type which were under construction, and Germany lost all of hers by the terms of the Treaty of Versailles. While battle cruisers were found exceedingly useful in the War, it is doubtful if any will be built for many years, as the Five-power Naval Pact so limited the number of capital



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UNITED STATES NAVY AIRPLANE CARRIERS AND AUXILIARY VESSELS

1. United States Naval Airship Tender, U.S S. "Patoka," used as a floating base for the airship "Shenandoah". In addition to shop facilities it carries a mooring mast.
2. U.S.S. "Langley," an experimental airplane carrier, showing a plane about to land on the flying deck of the ship



PHOTOGRAPH UNDERWOOD & UNDERWOOD, N. Y.

UNITED STATES NAVY LIGHT CRUISER "RICHMOND"

Displacement, 7100 tons Speed, 34 knots Battery, twelve 6 inch guns

ships, i.e. battleships and battle cruisers, that very little tonnage could be spared for the purpose.

Battleship. A battleship is a war vessel possessing the greatest offensive and the greatest defensive power, especially the former, which can be given to a ship without rendering inadequate such other necessary attributes as speed, habitability, seaworthiness, etc. Existing battleships may find new enemies which are too strong for them. Their design must then be so changed as to enable them to meet and conquer each new enemy or to render its attack comparatively innocuous. The "wooden walls" of the early nineteenth century put on armor to defend themselves against the increasing power of the gun and the explosive shell. Later types were fitted with numerous water-tight compartments, underwater armor, and the "bulge" or cellular belt, in order to meet the growing menace of the torpedo and the submarine mine; and to meet the torpedo carrier, surface, air, or submarine, a numerous battery of guns of moderate calibre was mounted. Further protection was derived from accompanying vessels, the light cruiser and the destroyer. Battleships, with other surface and submarine vessels, are now called on to meet bombing attack from the air; they must have armored upper decks and strong batteries of anti-aircraft guns and must be defended in the air by accompanying aircraft as they are defended on the water by cruisers and destroyers. The only battleships designed and laid down since the danger of aircraft bombing was fully gaged were the British ships, *Nelson* and *Rodney*. They are of 35,000 tons, the greatest size permitted by the Five-power Pact, and their design will be studied with interest by other powers. (See NAVIES OF THE WORLD, *Great Britain*.) A ship of premier force, capable of taking its place in the line of battle in a fleet action, is known as a capital ship. According to present classification, capital ships are either battleships or battle cruisers. The Five-power Naval Pact defined a capital ship as a vessel, not an aircraft carrier, with a displacement over 10,000 standard tons, or carrying a gun of a calibre in excess of 8 inches. No capital ship of more than 35,000 standard tons may be constructed by one of the signatory powers.

Cruiser. Cruisers are of four types: battle cruisers, armored cruisers, protected cruisers, and light cruisers. Armored cruisers, already described, and protected cruisers are obsolete. the latter derived its name from an armor deck covering the machinery and other vital parts; it was flat amidships but inclined downward at the sides at an angle about 40°, the lower edge reaching the side at 5 to 8 feet below water. Light cruisers are a development of the protected cruiser type. The distinguishing characteristic is very high speed. All have waterline belts of thin armor, 3 to 5 inches thick, and some later designs have part or all of the main battery guns in lightly armored turrets. Under the terms of the Five-power Pact, light cruisers cannot have a displacement in excess of 10,000 tons or guns of a greater calibre than 8 inches. Nearly all the light cruisers designed since the Washington Conference are of 10,000 tons and carry 8-inch guns. Smaller light cruisers will doubtless be built, and if the displacement is less than 7000 tons, most of the guns are likely to be of a calibre below 8 inches. See NAVIES OF THE WORLD, *France* and *Japan*.

Destroyer. Vessels of this type were originally designed to drive off or destroy torpedo boats, hence the name. The small torpedo boat is now obsolete, but the destroyer has succeeded to its functions and in addition has become the greatest protector of large vessels against submarine attack. The latest types of destroyers are from 1200 to 1500 tons with a maximum speed of 34 to 36 knots, 6 torpedo tubes, 4 guns of 4-inch to 5-inch calibre, and 1 or 2 anti-aircraft guns. See NAVIES OF THE WORLD, *France* and *Japan*.

Flotilla Leader. An enlarged destroyer designed to act as flagboat for the commanding officer of a destroyer flotilla. The displacement is from 1500 to 2500 tons. The maximum sea speed is usually slightly greater than that of the destroyers of their flotillas and the battery about 50 per cent more powerful. See NAVIES OF THE WORLD, *France*.

Fuel Ship. Fuel ships were formerly colliers. They are now oil-tankers. In addition to fuel oil they usually carry lubricating oil, cotton waste, and other engineering supplies which are bulky and much used. On account of its long distance from possible enemies, the United States has more naval fuel ships than any other country.

Hospital Ship. A vessel especially fitted for the care and transportation of the sick and wounded is known as a hospital ship. During the War dozens of such ships were needed, and passenger ships were refitted and adapted to the service.

Mine-Layer. Mine-layers are of all sizes and kinds, from small launches to vessels of 5000 tons or more. Large mine-layers carry their main supply on the lower decks or in the holds. The main operating deck is fitted with fore and aft tracks or trolleys on which the mines are placed when hoisted from below and from which they are dropped after being carried to the stern. Just before launching, the safety device is removed or set for service. The mine is still inoperative and will not explode until anchored in place, when the remaining safety fittings are automatically released. During the War a large number of mines were planted by mine-laying submarines which carried them in inclined tubes extending from the deck completely through the hull and bottom. By using submarine mine-layers, mines could be planted where the use of a surface vessel would have been impossible. See MINE, SUBMARINE.

Mine-Sweeper. As mines are usually anchored so as to be held 12 feet or more below the surface, it is highly desirable that mine-sweepers should draw less than 12 feet of water, 3 or 4 feet less if practicable. The great German mine-laying campaign, begun at once on the declaration of war and continued to the Armistice, found the British without mine-sweepers. Fortunately the steam trawlers, used so extensively in the British fisheries, were very efficient sweepers when they were fitted with proper appliances and their officers and crews had received suitable training. They continued to form the greater part of the mine-sweeping fleet; at the end of the War, out of 726 sweepers in service, 412 were trawlers, 110 were destroyers or vessels built as mine-sweepers, 52 were small paddle steamers, 142 were drifters, and 10 were sweepers of the "Dance" type. The danger of sweeping is shown by the fact that

214 sweepers were sunk or very seriously damaged. The boats (about 100 in number) which were specially built for sweeping were of 750 to 800 tons with a draft of 7 feet and had about 16 knots speed; one-third were paddle steamers, and the others had twin screws. These vessels, with the destroyers, formed the fast minesweepers. Sweeping was effected by a wire cable, 500 yards long, whose ends were carried by sweepers. This often exploded the mine or parted its mooring rope; if neither happened, bombs or depth charges were dropped on it. In 1915, the paravane (q.v.) appeared, and this was followed by the later type with cable-cutting jaws. Mines rising to the surface after the cutting of their cables were destroyed by gunfire.

Monitors. The monitors built during the War were shallow-draft armored vessels of moderate speed, used chiefly on the Belgian coast. Most of them had a single turret and carried guns of 6- to 15-inch calibre. Although styled monitors, they all had rather high freeboard; all were fitted with antitorpedo "bulges" on their sides. The Italians used enormous raft-line structures for defense of their army's right flank. Each of these carried a turret mounting heavy guns.

Patrol Boats. Probably 2000 of these were used by the Allies alone. They were of every conceivable type of small craft, yachts, motor boats, old torpedo boats, small destroyers, and boats built for the service. Of the latter were the *P* boats of Great Britain and the Ford boats built in the United States. Both types were about 600 tons. None of the Ford boats was completed in time for active service abroad. The fast motor boats were commonly called submarine chasers.

Q Ships. These were decoy ships. Small and old merchant steamers, sailing vessels, gunboats, etc., were transformed into inoffensive-looking craft apparently employed in coastal traffic or trade with Norway. All sorts of expedients were used to entice submarines within easy range, one of which was for part of the ship's force called the "panic party" to abandon ship ostentatiously when the submarine opened fire. If the latter approached close enough, the guns were uncovered and fire opened. Many *U* boats were sunk by *Q* ships, and many *Q* ships were sunk by their adversaries.

Repair Ships. These are vessels fitted as floating workshops, with all kinds of tools and appliances for the repair of vessels which are far away from their bases As the naval operations of the War were mostly confined to the small North Sea area, few of these were necessary.

Submarines. Vessels of the submarine type were greatly improved during the War. As the Allied naval forces were enormously more powerful than their enemies in regard to surface vessels, it was chiefly by means of submarines that Germany could carry on offensive naval war. The early successes against war vessels and the launching of the campaigns against merchant shipping gave great impetus to German submarine building. The constant use and consequent testing of boats and fittings naturally led to the elimination of defects and the steady development of types and appliances. The German boats were of six classes: the *Deutschland* type, about 1900 tons; cruiser type, about 2700 tons; ocean-going type, of 750 to 1000 tons; coast-defense (*UB*) type, of 250 to 500 tons; mine-layer (*UC*) type, of several sizes; and harbor (*UR*) type. Most of the boats were ocean-going, although the *UB* and *UC* boats were numerous. The British submarines were of six or seven distinct types; the *V* class boats of 460 tons were the smallest built during the War, and the *K* class were the largest. The boats of the classes *E* (800 tons), *H* (500 tons), and *L* (1070 tons) were most numerous; the three boats of the *M* class carried a 12-inch gun each. The *X1*, largest of all submarines, was completed in 1923. It is an experimental boat with a surface displacement of 2780 tons and a submerged displacement of 3500 tons. See NAVIES OF THE WORLD, *Great Britain*.

Submarine Chaser. See *Patrol Boat*, above.

Supply Ships. These vessels are of the cargo type and are fitted as refrigerator ships, general supply ships, and ammunition ships.

Tenders. These are vessels designed to accompany aircraft, destroyers, submarines, etc., and to act as a movable base of supplies, repairs, etc.

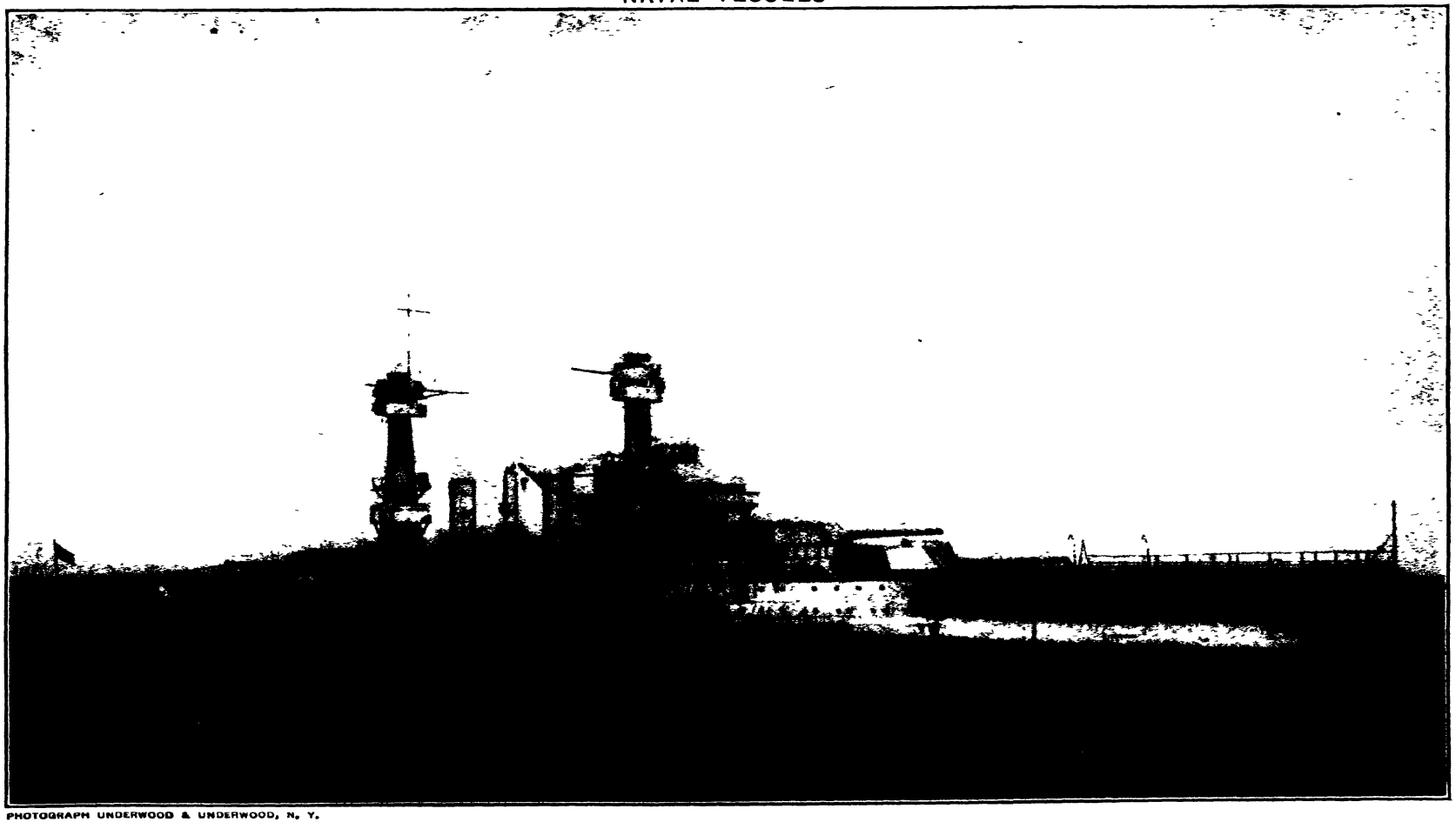
Torpedo Boat. A small, fast boat designed to use torpedoes in the attack of large vessels. The torpedo boat and the destroyer are small craft of the same general type. In the 1890's, torpedo boats were of less than 200 tons and very numerous. In 1893, the British navy built the *Havock* and *Hornet* of 240 tons to defend vessels against torpedo boats by attacking the latter. They were therefore styled torpedo-boat destroyers Besides having greater displacement, they carried 6-pounder and 12-pounder guns, while torpedo boats mostly carried 3-pounders. After that time the destroyer gradually grew in size and took on other functions. A few torpedo boats for harbor and smooth water service were built in recent years, but the type is almost obsolete. Old destroyers of less than 1000 tons came to be often classed as torpedo boats.

Transport. A vessel fitted for the transportation of troops, animals, or supplies. No nation possessed many of these; therefore, in times of war, merchant vessels had to be used and altered to adapt them to the service The American (formerly German) passenger steamer *Leviathan*, after fitting as a transport, carried 10,000 officers and men on each trip, in addition to her own complement.

U Boat. A name applied to German submarine boats because they were officially designated by a number preceded by the letter U, as *U125*. The "U" is an abbreviation of *unterseе* ('under water'). See *Submarines*, above.

VETERANS' BUREAU. See AGRICULTURAL EDUCATION; UNITED STATES, *History*.

VETERINARY MEDICINE. A gradual rise in the educational standards of this profession resulted in the requirement of four years' high school education or its equivalent for the class entering in the fall of 1919 and thereafter for the accrediting of a veterinary college and the eligibility of its graduates for United States government service. The requirements for admission to Civil Service examination for the government service were raised so that after the fall of 1917 a fourth year of study at a veterinary college, with an increased number of hours, was required. The conditions attending upon the War brought a great decrease in the number of students enrolled at



PHOTOGRAPH UNDERWOOD & UNDERWOOD, N. Y.

UNITED STATES BATTLESHIP "MARYLAND"

Displacement, 32,630 tons Speed, 21 knots Battery, eight 16 inch guns

veterinary colleges. With the close of the War the attendance increased somewhat but later declined, in part because of the increased educational requirements. These conditions resulted in the discontinuance of several colleges, and by 1923 there were but 15 accredited colleges in the United States, with a total student enrollment 738. Among those which gave way to State-supported schools were some of the oldest and best known institutions.

Foot-and-Mouth Disease. This disease of live stock, particularly of cattle and swine, has, because of its epizoötic nature, continued to be one of those most dreaded by the live-stock interests. Three countries, Canada, Australia, and New Zealand, have been entirely free from it for many years; others, including the United States, Great Britain, and Sweden, have been visited by it from time to time and have applied the slaughter stamping-out policy, as the British Dominions mentioned and Norway would if they were to be invaded. They prohibit the entry of live stock or apply drastic quarantine laws against the entry of diseased animals. Other countries where it is present deal with the disease by isolating infected stocks, regulating live-stock movement within their boundaries, and quarantining the animals they import; or they let the disease take its course without interference. Denmark and Holland periodically freed themselves from the disease, but became reinfected from neighboring countries.

Seven outbreaks have taken place in the United States, in 1870, 1880, 1884, 1902, 1908, 1914, and 1924. That of 1914 was by far the most serious, extending into 21 States and the District of Columbia, and necessitating an expenditure of over $5,500,000. The animals slaughtered at this time included 69,742 cattle, 73,574 swine, 8742 sheep, and 99 goats, with a total appraised value of $5,243,138.55. The first three crises were caused by the importation of infected animals, the fourth and fifth by the importation of contaminated cowpox vaccine virus, the sixth by materials contaminated through contact with leather or leather products imported from a foreign country in which the disease occurred, and the last, in California, was supposed to have originated in the feeding of pigs with garbage from steamships arriving from foreign ports In England, where the disease has appeared from time to time, investigations indicate that the infection is introduced by birds migrating from the continent, or is air borne In eradication work in England 70,000 cattle, 25,000 sheep, and 34,000 hogs were slaughtered up to the middle of 1924 in an effort to eradicate it.

Bovine Tuberculosis Eradication. In his annual report for 1916, the United States Secretary of Agriculture called attention to the wide dissemination of tuberculosis of farm animals, pointing out that it may be transmitted to man and is the source of annual losses in the United States estimated at more than $25,000,000. He outlined undertakings leading to its eradication, and asked for an appropriation of $75,000 to inaugurate the work. Congress responded with allotments for its investigation and eradication amounting to $300,000, of which $132,618 was expended. Offices were at once opened at several points in the country, and cooperative work commenced with the view to eradicating the disease from purebred herds and the establishment of accredited herds. In December, 1917, rules and methods were adopted, the plan followed being to test cattle with tuberculin, to eliminate any reacting animal, usually by slaughter, to repeat the test at prescribed intervals, and to list as tuberculosis-free accredited herds all which successfully pass two annual or three semi-annual tests, official certificates being issued to the owners of such herds. In 1918 Congress provided for the payment of one-third of the difference between the appraised and salvage value of the slaughtered animals, no payment by the Federal Government to be more than $25 for a grade animal or more than $50 for any purebred animal. Increased appropriations for the work were made by Congress from year to year until 1922, when the annual appropriation had reached $2,877,600, a large proportion of which was for payment of indemnities. By 1922 the cooperative eradication work had been extended to include all the 48 States and the Territories of Alaska and Hawaii. By that year (1922) the widespread demonstration of the possibility of freeing individual herds from the disease had resulted in an increased confidence in the area clean-up method, 23 States having joined in the movement, and more than 150 counties had completed or were in the process of testing all of their cattle, and nearly 300 more were making arrangements to begin the work. In the year 1923, 50 entire counties eradicated the disease from their herds, raising the total to 81. In that year there were 28,526 herds, containing 615,156 cattle, officially accredited as free from the disease, and there were 400,000 additional herds, containing some 4,500,000 cattle, under supervision, with unfilled applications on file for testing nearly 1,000,000 additional cattle. Similar eradication work was taken up by the Canadian government in 1919.

Rinderpest. This highly contagious and most fatal of the many diseases to which cattle are susceptible, and which has followed on the heels of European wars, appeared in 1920 and spread through Poland, causing a great loss. It was introduced into Belgium in July, 1920, with Brahman cattle from India, and spread into several provinces in Belgium and into northern France before it could be checked. A limited outbreak which occurred at Sao Paulo, Brazil, in March, 1921, the first upon the American continent, was eradicated in about three months.

Texas Fever and Tick Eradication. At the close of the fiscal year on June 30, 1913, the work in progress since 1906 had resulted in the clearing and release from quarantine of some 193,000 square miles of tick-infested territory. In the period following, which closed June 30, 1922, some 330,000 square miles were cleared, making a total of 72 per cent of the entire infested area of 729,852 square miles. The amounts appropriated each year by Congress for this work were increased from $325,000 in 1913 to $660,000 in 1923. Of the 975 counties in 15 States quarantined on July 1, 1906, 695 had been released by the end of 1923, leaving 280 counties under quarantine at that time. Up to the close of 1923, five States had succeeded in eradicating the tick and were out of quarantine. These were California, Kentucky, Missouri, South Carolina, and Tennessee.

Hog Cholera. This affection was estimated by the Federal Government in 1923 to cause a mortality of 4.05 per cent, a large reduction from the preceding year, and to be responsible

for about 80 per cent of all hogs lost by disease. In that year 2,564,837 hogs, valued at $29,393,032, were destroyed by it. Control work was commenced by the Federal Department of Agriculture in 1913 under an appropriation by Congress of $75,000, which was increased in amount from year to year until in 1919 the sum of $641,045 was made available for investigation, demonstration, education, and control work. The work has consisted in the making of surveys, production and use of serum on hogs on infected and exposed farms, sanitation and quarantine work, and organization of farmers to coöperate with the State and Federal authorities. Studies of a disease known as "hog flu," which has appeared and caused large losses in the hog-raising States, have shown that it is not related in any way to hog cholera.

Dourine. The occurrence of this disease of the horse, due to *Trypanosoma equiperdum*, necessitated eradication work by the Federal Department of Agriculture under annual appropriations by Congress, varying from $45,000 to $97,800. The work was pressed with great vigor in some seven States, resulting in its complete eradication from Iowa, Nebraska, North Dakota, and Montana.

Infectious Abortion. The importance of this insidious disease of cattle, horses, swine, and sheep is second only to tuberculosis, causing as it does the loss of the offspring, a decrease in the flow of milk, and possibly permanent sterility. In the cow and sow the disease is caused by a microorganism known as *bacillus* (or *bacterium*) *abortus*, which was first described by B. Bang, a European veterinarian. In the mare it is caused by an organism described by investigators at the Kentucky Experiment Station as *bacillus abortivo-equinus*.

Bacillary White Diarrhea of Chicks. This disease was discovered in 1909 to be due to a bacterium, which was described as *bacterium pullorum*. A rapid advance in the knowledge of the pathology and in control of the disease followed, and accredited white diarrhea-free breeding flocks were established in several States through use of the macroscopic agglutination test.

Malta Fever. The occurrence of this affection of the goat, which is transmissible to man, was first reported to occur in the United States in 1911, when the disease was discovered to be endemic among goats in southwest Texas. During the summer of 1922 an outbreak took place in Phoenix, Ariz., the first to occur in a city in the United States, in which more than 30 human cases were positively diagnosed.

Rabies. A serious wave of rabies infection among wild animals, particularly coyotes, in the northwestern United States, which caused a large loss of live stock, led to an appropriation by Congress for effective control work by the Department of Agriculture.

Epizoötic Lymphangitis. This disease was introduced into France with horses from North Africa during the War, and became one of the most important diseases with which the army veterinarian had to deal.

Botulism and Forage Poisoning. Investigations have shown that *bacillus botulinus* is probably the cause of much of the loss among horses and mules resulting from forage poisoning and also is a cause of limberneck in chickens. See BOTULISM.

Parasitology. Equine piroplasmosis due to *piroplasma equi* was discovered for the first time on the American continent in 1913, it being found to be endemic among native horses in the interior of Panama. *Cysticercus ovis*, the intermediate stage of a dog tapeworm (*tænia ovis*), was shown in 1913 to be the cause of tapeworm cysts, or measles, in mutton, and of common occurrence in sheep in the western United States. Tapeworm cysts in beef carcasses were found in 1914 to be destroyed by an exposure for six hours to a temperature of 12 ° to 15 ° F. Important studies of Manson's eye worm of chickens were reported from Hawaii. Studies of *trichinella spiralis* have shown that the larvæ in pork die after an exposure to a temperature of 131° F. gradually attained, and this is held to be the thermal death point. Refrigeration at a temperature of 5° F. for a period of 20 days was found in 1915 to destroy it in pork. *Habronema muscæ* was discovered in 1913 to be transmitted by the house fly. The kidney worm was found to parasitize nearly 50 per cent of the native dogs on the Island of Luzon. It was shown in 1915 that larvæ of the ox warble enter the host by penetrating the skin. The intermediate or cysticercoid stage of the tapeworm *choanotænia infundibuliformis* of chickens was found in 1916 to occur in the common house fly. It was demonstrated in 1918 that *ascaris lumbricoides* of man and swine has a direct life cycle, and that no intermediate host is required. The embryos hatch out in the alimentary tract, migrate to the lungs and other organs, and cause pneumonia of pigs, the symptoms of which are commonly known as thumps. Carbon tetrachloride was found in 1921 to be highly efficacious in the removal of hookworms from dogs and foxes, ascarids from dogs, and large strongyles from horses.

Necrology. Among the many prominent veterinarians who passed away during the decade 1914–24 were Dr. Daniel E. Salmon, 1914; Dr. A. D. Melvin, 1917; Dr. Alexander F. Liautard, 1918; Dr. James Law, 1921; Dr. E. W. Hoar, 1921; and Dr. John G. Rutherford, 1923.

Journals. In 1915 the *American Veterinary Review*, the oldest veterinary journal published in America, having completed its 47th Volume, became the *Journal of the American Veterinary Medical Association* and was edited by the Secretary of that Association. In 1920 the name of the *American Journal of Veterinary Medicine* was changed to *Veterinary Medicine. The North American Veterinarian* and the *Canadian Veterinary Record*, a quarterly journal, both commenced publication in 1920.

VIBRATION. See PHYSICS.

VICTOR EMMANUEL III. See ITALY, *History*.

VICTORIA. A state of the Commonwealth of Australia, in the southeastern part of the continent. Area, 87,884 square miles; population in 1911, 1,315,551; in 1922, 1,570,640; annual average increase, 1.54 per cent. Melbourne, the capital and largest city, including its suburbs, had 795,000 inhabitants in 1921 (591,830 in 1911). In 1921 about three-fifths of the total population was urban. Farming continued to occupy a leading place in the state's activities. Wheat, hay, oats, barley, and potatoes were the most important crops. Pastoral pursuits followed next in importance. The wool output in 1919–20 was 132,847,000 pounds; in 1920–21, 90,250,000, as compared with the 1913–

14 output of 106,833,000 pounds. The total mineral production in 1921 was £1,490,935 as compared with £2,344,744 in 1913. The gold yield steadily dropped; the output was worth only £443,938 in 1921 (£1,847,475 in 1913). In 1920–21, 140,743 employees were engaged in manufacturing (118,744 in 1913). Values for production in 1920–21 were: agricultural, £25,-190,350; pastoral and dairying, £24,816,620; mining, £1,607,645; forest, £1,954,750; miscellaneous, £5,159,996; total, £58,729,361; manufacturing value added £38,330,232. Imports overseas in 1913 were valued at £24,387,073; in 1921–22, £34,616,775. Exports for the same years were £17,835,395 and £34,704,850. Leading exports were gold, wool, cereals, and meats. In 1921, there were 4332 miles of railway open (3747 in 1914). Government accounts showed: revenues for 1912–13 and for 1921–22, £10,287,-285 and £19,287,000; expenditures for the same years, £10,258,081 and £19,247,000. Public works continued to account for the increased public debt. In 1912–13 the debt amounted to £62,776,-724; in 1923 it had increased to £114,568,597. Unlike the other states, Victoria was the seat of Australian Conservatism, her large agricultural population making for a desired stability.

VICTORY LOAN. See UNITED STATES, *History*

VIEBIG, CLARA (1860–). A popular German novelist (see VOL. XXIII). She is the author of *Mutter und Frauen* (1918), *Eine Handvoll Erde* (1920), and *Tochter der Hekuba* (1922)

VIENNA. A province of the Republic of Austria. Area, 107 square miles; population, census of 1923, 1,863,783. See AUSTRIAN REPUBLIC.

VIERNE, LOUIS-VICTOR-JULES ((1870–). A French organist and composer, born at Poitiers. He studied the organ under Franck and Widor at the Paris Conservatoire and graduated in 1894 as winner of the first prize. In 1900 he became organist at Notre Dame in Paris and professor of organ at the Schola Cantorum. Numerous recitals in Paris and tours of France, Switzerland, the Netherlands, England, Spain, and Portugal established his reputation as one of the greatest living masters of the organ. He wrote a symphony and *Suite Bourguignonne* for orchestra; *Praxinoe, Princesse d'Egypte* for soli, female chorus, and orchestra; *Messe Solennelle* for chorus and orchestra; a string quartet, a violin sonata and a 'cello sonata; four organ symphonies and numerous other works for organ; sacred music; piano numbers, and songs.

VILLA, FRANCISCO (PANCHO) (1868–1923). A Mexican revolutionary general, born in the state of Durango, the son of half-breed parents of the peon class. He grew up without education and became a bold and skillful leader of bandits and cattle thieves. He joined the revolutionists against Diaz in 1910 and was captured by General Huerta, but he escaped into Texas. Returning to Mexico, he raised a force of some 35,000 men to assist General Carranza against Huerta. After the defeat of Huerta, Villa quarreled with Carranza, and with the help of Zapata he caused Carranza to flee from Mexico City. In March, 1916, raiding Columbus, N. M., he killed 17 Americans and wounded seven. This was the cause of the American expedition, under General Pershing, to capture Villa "dead or alive." Although overtaken at Guerrere and seriously wounded, Villa made his escape. After that his power declined, and on his promise to settle down as a peaceful citizen, the Federals gave him $2,000,000 for himself and his men, a small farm for each man, and a ranch for himself. His assassination near Parrel in Mexico on July 20, 1923, was attributed to the vengeance of a family some of whose members he had killed.

VILLAMOR, IGNACIO (1863–). A Philipine jurist, born at Banguad, P. I., and educated at San Juan de Letram College at Manila, and in the law department of the University of Santo Tomas. From 1902 to 1906 he was Judge of the Sixth Judicial District of the Philippine Islands and was Attorney General from 1907 to 1913. He served as Secretary of State in 1913–14 and from that year until 1918 was president of the University of the Philippines. In 1920 he was appointed Associate Justice of the Supreme Court of the Philippine Islands. He was the author of several books on law administration in the Philippines.

VILNA DISTRICT. This region, the northern zone of that long corridor which the Poles claimed as their rightful eastern boundary, was the scene of a long dispute between Poland and Lithuania which was not settled until the line finally drawn by the Council of Ambassadors on Mar. 15, 1923, gave the district to Poland. Lying between Grodno on the south and Dvinsk on the north, with the city of Vilna at its centre, and possessing the important Warsaw-Vilna-Dvinsk railway section, the territory has an area of some 6000 square miles and a population put at 1,300,000. Of this, according to the Polish estimates, Poles totaled 25 per cent, although the prewar census had put the figure at only 10 per cent. Besides Lithuanians, there were also to be found here White Russians, Jews, and Germans, and the racial and nationalistic loyalties of this diverse population made the demarcation of a just line practically impossible. At the Peace Conference an attempt was made to cut the Gordian knot with the so-called Curzon line which kept almost rigorously to the confines of Congress Poland and left the Vilna district to Lithuania (accepted by the Supreme Council, December, 1919), but the settlement was deemed inadequate by almost all the Allies, including France and the United States, and was never observed by Poland. The spectre of Bolshevism largely aided the Polish purposes. Posing as the champion of oppressed peoples and as the rampart on the east of western ideals, although completely disregarding the desires of the peoples involved and the vaunted principles of self-determination, Poland pushed into the disputed region and effectively occupied it. Not only was the hostility of the Lithuanians awakened, for they regarded the town of Vilna as the centre of their nationalistic aspirations; but the Russians were equally aroused. Here was the reason for the perplexing events of 1920. Early in 1920 Poles massed against the Red armies, took Dvinsk, entered Vilna on April 20, and then pushed triumphantly across White Russia and captured Kiev on May 8. This was the high water mark of Polish success and was followed by equally notable defeats. With the Poles in full retreat by July the Supreme Council hastened to take action. The Spa Conference suggested that the Poles retire behind the Curzon Line and broached the question of a general conference. But noth-

ing came of it, and the Russian advance continued Meanwhile Lithuanians had reëntered Vilna and on July 12, a Russo-Lithuanian treaty ceded the disputed district to the Lithuanian government. By the end of July the Russians were threatening Warsaw; in another two months so bewildering were the reverses, the Poles had turned about, routed the Russian armies, and passed beyond Grodno, Brest-Litovsk, Kovel, and Luck. Vilna was again theirs The attempt of the League of Nations Council to take a hand in the dispute proved a failure, for while on October 7 a League commission fixed a neutral zone leading to the city of Vilna and along a line running about forty miles north and south (the Suwalki agreement), two days later General Zeligowski, at the head of a Polish irregular force, entered the city and claimed it for Poland. On Oct 12, 1920, by the Treaty of Riga, Russia recognized Polish claims to the whole disputed zone on the east of Poland, including Vilna and stretching so far south as to take in the whole of East Galicia. The Poles took possession of Vilna at once and held a plebiscite in the city in January, 1922; this, proving favorable to Poland, was followed by the seating of the Vilna delegates in the Polish parliament. All this, of course, was against the bitter but futile protests of Lithuania. As late as February, 1923, there was fighting between the Lithuanian and Polish troops for the possession of the southern portion of the Suwalki zone of the west, lying between Grodno and Vilna, and again the Poles were triumphant. Thus the Poles had met with success in almost all their purposes in the east, and only a legal sanction was necessary to make their occupation final. This came on Mar. 15, 1923, when the eastern boundary fixed by the Council of Ambassadors was made to follow the Treaty of Riga line on the east and to include the whole Vilna district on the northeast. Lithuania refused to accept the ruling and every indication pointed to the continuance of a Lithuanian irredentism in the district.

Kresy. By this name the Poles designate the portion of the eastern corridor lying between Vilna and East Galicia and east of the Curzon Line. Claimed by both Poland and Russia, it, too, was finally ceded to Poland in March, 1923. Made up of part of White Russia and the Ukraine, with an area of some 43,000 square miles, this border region seated a population of some 3,700,000, of whom according to the Poles, 32 per cent were Polish, while the pre-war Russian census showed a Polish population of only 6 per cent. This region was affected by all the happenings that influenced the fortunes of Vilna It lay beyond the Curzon line; it was won, lost, and won again by the Poles in their operations against the Red armies in 1920; it was yielded up to Poland by Russia as the result of the Riga Treaty; and finally in March, 1923, it was included in the Polish state by the decision of the Council of Ambassadors. With their customary despatch and with a complete disregard of the desires of the large racial minority living here, Polish officials proceeded to nationalize the annexed territory The Polish language was substituted for the Russian; Polish peasants were colonized; the administrative centres, in order to break the alien influence, were moved from such large cities as Grodno to cities of secondary importance like Bialystok and Novogrodek, the latter without even a railway connection. But the "Kresy" looked to Moscow as Vilna did to Kovno, and in spite of the fact that Soviet Russia, after October, 1920, made no attempt to regain these lost provinces, there was every reason for believing that the settlement had too many artificial elements in it to be lasting. The danger zones in the Polish system included almost half its 1924 area, i.e. Vilna, "Kresy," East Galicia (q.v.), and Upper Silesia (q.v.), where there were large irredentist groups in whom Germany and Russia could not help being interested; and that such an arrangement presaged grave consequences for the peace of Europe only an optimist could deny

VINCENT, Edgar First Baron D'Abernon. See Abernon, Edgar Vincent D'.

VINOGRADOFF, Sir Paul (1854–1925). An English jurist and educator (see Vol. XXIII). He lectured at the University of Calcutta in 1913–14 and at the University of Leyden in 1921. From 1914 to 1917 he was editor of the Russian section of the *Social and Economic History of the War* published by the Carnegie Endowment Fund Other later books include *Outlines of Historical Jurisprudence* (vol. i, 1920; vol. ii, 1922).

VIRGINIA. Virginia is the thirty-third State in size (42,627 square miles), and the twentieth in population; capital, Richmond The population increased from 2,061,612 in 1910 to 2,309,187 in 1920, a gain of 12 per cent. The white population increased from 1,389,809 to 1,617,909; negro, from 671,096 to 690,017; native white, from 1,363,181 to 1,587,124; and foreign-born white, from 26,628 to 30,785. Both urban and rural populations rose during the decade, the former from 476,529 to 673,984 and the latter from 1,585,083 to 1,635,203. The growth of the principal cities was as follows: Richmond (q.v.), 1910, 127,628; 1920, 171,667; Norfolk (q.v.), 67,452 to 115,777; Portsmouth, 33,190 to 54,387; Roanoke, 34,874 to 50,842.

Agriculture. Although Virginia is one of the minor cotton-producing States, a comparatively large area is devoted to its cultivation, and the production of cotton did not suffer so much during the decade 1914–24 from the ravages of the boll weevil and other destructive insects as in the States farther south The weevil did not reach the State until 1922 and on account of the cold of the winters was not expected to be a serious menace. A comparison of the acreage and production for several years indicates that the production of cotton was, with the exception of one or two years, comparatively stable. In 1913 the acreage was 47,000 and the production 23,000 bales; in 1915, 34,000 and 16,000; 1918, 44,000 and 25,000; 1920, 42,000 and 22,000; 1922, 53,000 and 25,000. The estimated production for 1923 was 27,000 bales

While the population of the State increased 12 per cent in the decade 1910–20, the number of farms increased only 1.2 per cent (from 184,018 to 186,242). The total acreage in farms, moreover, decreased from 19,495,636 to 18,561,112, or 4.8 per cent; and the improved land in farms from 9,870,058 to 9,460,492 acres or 4.1 per cent. The total value of farm property apparently increased 91.4 per cent in the decade, from $625,065,383 to $1,196,555,772; the average value per farm, from $3397 to $6425. In interpreting these values and indeed all comparative values in the decade 1914–24, the in-

flation of the currency in the latter part of the period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. The percentage of the total area in farms decreased from 75.7 in 1910 to 72 in 1920, while the percentage of improved land in farms decreased from 38.3 to 36.7 per cent. Of the 1910 total of 186,242 farms, 136,363 were operated by owners, 2134 by managers, and 47,745 by tenants. The comparative figures for 1910 were 133,664, 1625, and 48,729. In 1920 there were 138,456 white and 47,786 colored farmers; in 1910, 135,904 white and 48,114 colored. Farms free from mortgage in 1920 numbered 98,470; those under mortgage, 24,331. In 1910 there were 111,474 farms free from mortgage, and 21,182 mortgaged. The total number of cattle in 1920 was 909,795, of which 509,305 were dairy cattle. In 1910 cattle numbered 859,067, and dairy cattle 356,284 Sheep, in 1920, numbered 342,367, compared with 804,873 in 1910; hogs, 941,308, compared with 797,635. The estimated production of the principal farm products in 1923 was as follows: corn, 52,695,000 bushels; wheat, 11,145,000; oats, 3,370,000; barley, 227,000; potatoes, 12,938,000; sweet potatoes, 5,236,000; tobacco, 123,363,000 pounds, and hay, 791,000 tons. For cotton, see above. Comparative figures for 1913 are: corn, 51,480,000 bushels; wheat, 10,608,000; oats, 4,192,000; barley, 286,000; potatoes, 9,870,000; hay, 952,000 tons; and tobacco, 154,000,000 pounds.

Mining. The chief mineral products of the State are coal, clay products, cement, and stone. Of these, coal is by far the most important. The progress of coal mining in the decade is indicated by the following production figures: 1914, 7,959,535 net tons; 1915, 8,122,596; 1916, 9,707,474; 1917, 10,087,091; 1918, 10,289,808; 1920, 11,378,606; 1921, 7,492,378; and 1922, 10,491,174. The value of the clay products averaged between $2,000,000 and $3,000,000 annually. The State also produces iron ore, sand and gravel, and gypsum. The total value of mineral products in 1921 was $32,810,842, compared with $69,161,247 in 1920; $36,799,407 in 1919; $37,639,368 in 1918; and $16,400,347 in 1914.

Manufactures. Virginia showed considerable increase in manufacturing after 1909. In 1920 there were 11 cities having more than 10,000 inhabitants. These formed 23.8 per cent of the total population and in 1919 produced 52.2 per cent of the value of the State's manufactured products. In 1909 there were in the State 5685 manufacturing establishments; in 1914, 5508; and in 1919, 5603. Persons engaged in manufacture numbered 120,797, 118,109, and 139,178; and the capital invested amounted to $216,392,388, $261,561,288, and $463,644,498, in those years The value of the manufactured product amounted to $219,793,868 in 1909; $264,039,041 in 1914; and $643,511,621 in 1919. The increase in value of products in 1914–19 was largely due to the change in industrial conditions brought about by the War and cannot properly be used to measure the growth of manufactures during the period; but the increase in number of wage earners clearly indicates a decided growth in the manufacturing activities of the State. The first industry in point of value of products is the manufacture of tobacco. This, in 1909, amounted in value to $25,385,000; in 1914, to $30,096,000, and in 1919, to $78,350,000 Lumber and timber products rank second in point of value, with $35,855,000 in 1909; $32,449,000 in 1914; and $56,394,000 in 1919. The chief manufacturing city was Richmond. In 1909 there were here 380 manufacturing establishments, with a product valued at $47,358,000; in 1914, 466 with $62,491,000; and in 1919, 550 with $156,724,000.

Education. The progress of education in Virginia was marked by important steps in the decade 1914–24. The Legislature, especially in the latter part of that period, passed several important laws which greatly assisted the administration of the school system. The Assembly of 1922 enacted three important educational bills, covering compulsory education, the county unit system of school administration, and the adoption and distribution of textbooks. The compulsory education law was greatly superior to that previously in force. The county unit law became effective in September, 1922. Negro education is a problem in Virginia as in other southern States, but in this phase of education also there was progress. Twenty-three county training schools were being maintained for negroes, and from the Julius Rosenwald fund, nearly 160 public schools had been built for colored people. Vocational work under the Smith-Hughes Law was established in 1917–18, including vocational agriculture, vocational home economics, and trade and industrial education In 1922–23, 53 of the 100 counties of the State were provided with training in vocational agriculture The work in trade and industrial education, which was meeting with considerable success, was intended to serve pupils enrolled in public schools, those already engaged in industry, who could give a part of their time to industrial class work, and others. Notable progress was also made in the programme of health and physical education. Approximately 75 per cent of the pupils in the schools received physical inspection under the general direction of the State Board of Health and the State Board of Education in 1922–23. The total school enrollment in the State increased from 474,210 in 1915 to 562,998 in 1923. The city enrollment in the latter year was 118,638; county, 440,360; total in white schools, 390,458; and total in schools for negroes, 155,577. The total disbursement for school purposes in 1923 was $23,634,398. The percentage of illiteracy in the State decreased from 17 9 in 1910 to 13 5 in 1920· in the native white population, from 9.4 to 7.1 per cent; in the foreign-born white, from 9.3 to 7.5; and in the negro, from 37.1 to 29.3.

Finance. For finance, see STATE FINANCES.

Political and Other Events. The Democratic party continued in the control of the State in the decade 1914–24. State elections in Virginia are held in the odd years, quadrennially. Elections were held in 1914 for Representatives in Congress. The Democrats were successful in all districts except one. At this election a measure providing for State-wide prohibition was adopted by the people. In 1916 elections were held for United States Senator, and Senator Claude A. Swanson was reëlected. In the presidential voting in this year, President Wilson received 102,824 votes; Charles E. Hughes, 49,256. On Mar. 1, 1916, the prohibition law went into effect. A new law also went into effect providing for the removal of public officials for failure to enforce any statute. In

1917 the Democratic candidate for governor, Westmoreland Davis, was elected. Senator Martin was reelected in 1918. He died in 1920, and Carter Glass, Secretary of the Treasury, was appointed to fill out his unexpired term. In the presidential voting of this year, J. M Cox received 141,670 votes; W G. Harding, 87,458. The Democratic candidate for governor, E. Lee Trinkle, was elected in 1921, and in 1922 Senator Swanson was reëlected. At this election the voters defeated a proposal for a constitutional convention. In 1923 the battlefield of Yorktown was selected by the Secretary of War as a proposed national park. The government already owned 10 acres on this site, and it was proposed to purchase 1180 acres more Within the limits of the proposed park are the old American and British breastworks, still largely intact.

Legislation. The most important measures enacted in the decade 1914–24 are noted below. The House of Delegates, on Mar. 11, 1914, rejected the woman suffrage amendment. The Legislature of 1918 passed measures regulating the practice of women at law. A general prohibition law was passed, and a commission was appointed to study the educational system of the State. Laws regulating the labor of women and children were amended, and an elaborate measure was enacted relating to safety in industry. A new workmen's compensation law was also passed. In 1919 the Legislature rejected the woman suffrage amendment. At this session the Legislature passed a law providing for a budget In 1920 the Legislature established an agricultural experiment station, appointed a commission to study the condition of the blind, regulated the fire insurance business, and extended the powers of building and loan associations. In 1922 the Legislature amended the laws relating to labor and the workmen's compensation law and passed a motion picture censorship bill. In 1923 a special session of the Legislature was held This passed a series of acts relating to highways and motor vehicles and enacted a measure designed to prevent the operation of "rings" among bidders for State work. During the regular session of 1924, the Legislature passed an act regulating more rigidly the operations of the Virginia Pilot Association, which, up to that time, had been a powerful political factor in the State Numerous drastic provisions were also added to the State prohibition laws.

VIRGINIA, UNIVERSITY OF. An institution at Charlottesville, Va., founded in 1819. The student enrollment, including the summer quarter, for the scholastic year 1913–14, was 2138, as compared with 4559 in 1923–24. The faculty in 1914 comprised 51 professors, 22 instructors, and 30 assistants, a total of 103; in 1924, 91 professors, 40 instructors, and 77 assistants, a total of 208. During this decade the institution received from Paul Goodloe McIntire $200,000 to found a School of Commerce and Business Administration; $150,000 to found a School of Art, now known as the McIntire School of Fine Arts; $70,000 for an amphitheatre and outdoor organ; $50,000, to which other donors have added $115,000, for two wings to the hospital; and from John B. Cobb $118,000 for the Cobb Chemical Building and Laboratory, besides $300,000 for a new gymnasium from students, alumni, and others, and many gifts of smaller sums for scholarships, etc. The library contained 123,000 volumes in 1924. President, Edwin Anderson Alderman.

VIRGIN ISLANDS. An American dependency in the West Indies, consisting chiefly of the islands of St. Thomas, St. Croix, and St. John's Total area, 132 square miles. The United States took possession of these islands, following their purchase from Denmark for the sum of $25,000,000, on Mar. 31, 1917. At that time the population was approximately 27,000 In 1920 the population showed a decrease of some 1000. Of the total population, 80 per cent were negroes, 13 per cent of mixed race, and 7 per cent whites.

Production. Agriculture was formerly the chief industry of the islands, but since the abolition of slavery the laboring-classes showed a tendency to concentrate about the ports. Some 70,000 acres were devoted to agriculture in 1917 In 1920 there were 430 farms, 102 worked by white farmers and 270 by negroes. Sugar cane is the chief product. In 1917, about 9000 acres were devoted to sugar cane; its product was valued at about $440,000. The total value of farm products in that year amounted to $3,706,911. Other products were vegetables, cotton, fruits, and nuts. The value of all crops in 1917 was $522,606.

Commerce. The value of the Virgin Islands lies in their geographic location and their exceptional harbor facilities rather than in their commercial and agricultural interests. The chief exports are sugar, hides, skins, and cabinet woods. Prior to the enactment of the United States prohibition amendment, there was a large export of rum, and the cutting off of this source of revenue had a very serious effect on the economic condition of the islands. Exports to the United States in 1917 were valued at $1,259,607. In 1922–23 they had fallen to $743,463 Imports from the United States in 1917 amounted to $1,416,342 and in 1922–23 to $1,564,342.

Education. Education was compulsory The total enrollment in the public schools of the islands was 3201 on June 30, 1923. Junior high schools were established and night schools opened in several of the larger towns. Manual training schools also were established.

Transportation and Communication. Regular transportation was maintained between the islands and New York City. Each municipality had a post office, cable office, and telephone system. The naval station at St. Thomas had a powerful radio station. There was also a naval station in the island of St. Croix.

History. The islands were administered by the United States Navy Department, the governors for the period being Rear-Adml. James H. Oliver (1917–19), Rear-Adml. Joseph W Oman (1919–21), Capt. Sumner E. W. Kittelle (1921–23), Capt. H H. Hough (1923), Capt. Philip Williams (1923–). By the Organic Act of Mar. 3, 1917, the United States Congress vested all military, civil, and judicial powers in a governor appointed by the President and continued in force the Danish code under which the islands had been governed. Citizenship was held by males over 25 possessing an annual income of 1500 francs. Criticism was frequent in the United States on the despotic character of the American administration. It was charged that Americans, unlike their Danish predecessors, refused to fraternize with the negroes, that free speech was being suppressed and local lead-

ers proceeded against summarily, and that the continuance of the Danish code deprived the great majority of the exercise of the ballot. On another ground, there were complaints in many quarters that the American officials were doing nothing to aid the economic development of the islands.

VISION. See PSYCHOLOGY, EXPERIMENTAL.

VISTULA RIVER. See DANZIG; POLAND.

VITAL STATISTICS. The movement of population during the decade 1914–24 was temporarily perturbed by the years of war and pestilence, 1914–19. After this period the birth and death rates became stabilized, but further confusion resulted from the formation of new states, and no figures are available for Russia, the Balkans, Greece, and some of the new national states of Europe. Few figures can be furnished for Asia, Africa, South America, or Latin North America.

Deaths. The gross death rate is available for the regions to be enumerated, but the figures possess very limited value; for infant mortality, as well as deaths by ages and sex, are not separately given, and there are no means for determining the reasons for the great disparities of mortality in different countries. Under a similar civilization, the death rate of Chile is nearly double that of Argentina; the mortality of Scotland is sensibly higher than that of England and Wales. The death rate is notably higher in France than in Germany and Great Britain and much higher in Spain than in Italy Complete figures for any of the more recent years cannot be supplied, for in some of the countries no data have been compiled since 1920; others cover 1921, and a few extend to 1922. In most of the statistics the population on which the death rate per 1000 is computed is only an estimate. Hence the percentages are only approximations. The lowest figures are supplied by New Zealand, with a death rate between 8 and 9 per 1000 inhabitants, and Australia with 9.1; at the other extreme stands Chile with more than 34. Other very low figures are furnished by Holland and Denmark, with 11 each. England and Wales show slightly below 13, which is about the rate in Belgium, while Switzerland has between 13 and 14, and the death rate for the whole of Canada was 13.74 for the year 1921. Germany shows a mortality of 15, which agrees with that of Scotland and Finland. The figure for Italy is 16; that for France, slightly below 18. Austria and Argentina have about 18.

Death rates above 20 are shown by Spain with 21 and Japan with 23. Figures available for tropical countries are not numerous. Dutch Guiana gives 22, while Costa Rica has about 20 and Ceylon 31. Further figures could be supplied, but as already stated, the lessons of these crude statistics are not obvious. They may be contrasted profitably, however, with death rates in the United States for 1922. The general mortality of the registration area of the United States for that year was 11.8. Idaho has the lowest rate (8.1) and is therefore comparable with New Zealand, while the States with highest death rate were Maine and Vermont, with 14.7 each. These crude figures do not represent the actual mortality, and if the deaths are adjusted to allow for sex, age, etc. it would be found that Nebraska with 9.1 is the healthiest State, while Colorado with 13.5 has the highest death rate.

Age and Sex. The United States issues two sets of mortality figures, one termed "crude" and the other "adjusted" by reason of its corrections for age and sex groups. Separate figures for sex and age, aside from infant mortality, are not supplied. In other countries only crude figures appear to be given, with the occasional exception of infant mortality.

Infant Mortality. Figures under this head are difficult to obtain. In Great Britain it was announced in 1923 that the infant mortality had dropped from the 1903 figure of 133 per 1000 to 77 per 1000. In the United States the death rate during the first year of life was in 1924 about 76 for the entire registration area; it varies from 127 in South Carolina (1921) to 50 in Oregon cities (1921). Even this low figure has been surpassed in New Zealand, where a minimum of 45 deaths per 1000 was attained in 1919. These figures of infant mortality vary, some reports including and others excluding stillbirths, but in general the figures apply only to live births. The superior figures in certain countries are due in part to natural conditions but very largely to intensive child-welfare campaigns.

Births. Figures on births and excess of births over deaths are found in the same frequency as death reports. A few of these follow. Argentina in 1920 had 276,000 births, an excess of nearly 130,000 over the deaths; the rate was about 32 per 1000. In Australia the surplus of births over deaths in 1921 was 82,117; the birth rate, about 33. The surplus in Austria was 21,000; the birth rate, about 21. In the whole of Canada the surplus for 1921 was about 135,000; the rate, between 29 and 30. In France in the same year the excess of births was 117,000, and the birth rate agreed with that of Austria. By contrast, the surplus of births in Germany for the same year was nearly 700,000; the rate was over 26. In Great Britain the surplus in England and Wales for 1922 was 294,000; in Scotland, 43,000; and in Ireland (1921), 27,000. The birth rate for England and Wales was over 25; that of Scotland, 23; and that of Ireland, over 24. In Italy the surplus was over 461,000; the birth rate, about 28. The surplus and birth rate signify little in the absence of data covering infant mortality, which commonly varies directly with the birth rate. The general birth rate of the United States for 1922 was 22.7, which represented quite a falling off from the preceding year, when it was 24.3. The surplus of births over deaths was 720,000. The highest birth rate was in Wyoming cities with 34 4; lowest, in rural Washington (17.3). Japan has a high birth rate, about 35, but its surplus was not correspondingly large in comparison with Germany; the latter had almost as large an excess, with a much lower birth rate

Marriages. This subject is of some special interest in connection with the decimation of the peoples of the warring countries. In France the anticipated increase in the marriage rate reached its high mark in 1920 with 623,869 and fell in the next year to 456,221. The number of German marriages in 1921 was 729,809; figures for the years immediately preceding are not available. In England and Wales the number of marriages for 1922 was 299,630. In 1920 it had been 379,568, and in 1919 the figure was 369,007. The figures of the Department of Commerce of the United States do not appear to take cognizance of the number or rate of marriages per annum but bulletins which cover

the married state are occasionally released and one of these issued in 1922 gave the status of the married and single for 1920. Of 36,900,663 males over 15 years of age, 21,849,266 were married, and 1,758,308 were widowers, while 235,285 were divorced. Of 35,177,515 females over the age of 15, 21,318,933 were married at the time; 3,917,625 were widows, and 273,304 were divorced. The number of single males over 15 was 12,967,565; single females, 9,616,902. The number on whom information could not be obtained concerning the married state was 110,240 males and 50,751 females. The largest proportion of married men was found in Mississippi and Arkansas and the smallest in Nevada, percentages varying between 62 8 and 45.9.

Birth Control. Does birth control tend to lower the number of births and birth rate? The only evidence thus far is supplied by Holland and gives a negative answer. In 1921 the excess of births over deaths was 112,544 and the birth rate 28, which is high for a state with high civilization; in some years this rate was even higher. In 1916 it was 31. See BIRTH CONTROL

VITAMINE, OR VITAMINES Since their discovery in 1909, the vitamines have never been isolated. Because of their occurrence in yeast, a substance long reputed to have medicinal properties, vitamines, or rather yeast, was urged vigorously by yeast manufacturers as a universal panacea This manufactured craze apparently ran its course and subsided. The subject of vitamine remained of absorbing interest, and many monographs have appeared on the subject. Originally, as discussed under FOOD AND NUTRITION, there were three of these bodies, absence of any one of which from the diet was known to entail the development of a so-called deficiency disease If the water-soluble or B vitamine is lacking, the disease beri-beri develops, and if the fat-soluble or A vitamine is deficient, a peculiar affection of the eyes results. Both these affections are little known in America and Europe If on the other hand the C vitamine is missing, scurvy develops; in civilized, temperate-zone countries it is prone to attack young children. It is, however, easily prevented and cured by the use of fresh fruits, fruit juices, and tomatoes. It was learned during the War that famine conditions do not necessarily lead to the development of these deficiency diseases, because the cheapest and commonest foods usually contain sufficient vitamine; the only real danger lies in the use of a monotonous diet, such as peeled rice or preserved foods. Deprivation of vitamine in the growing child would in theory mean death or stunting, but as a matter of fact the only deficiency disease actually and constantly encountered is infantile scurvy The original number of vitamines has recently been increased by a fourth, the absence of which from the diet may perhaps, in conjunction with other factors, be a cause of rickets. (See RICKETS.) In May, 1924, Prof. Walter H. Eddy of Columbia University announced the isolation in pure state of Vitamine D, a study of which reveals its identity with a substance known as Wildier's Bios, a sort of forerunner of the vitamines, which dropped out of sight after their discovery. See also DIET; SCURVY; SECRETIONS, INTERNAL.

VITTADINI, FRANCO (1884–). An Italian composer, born at Pavia. Having received his first musical instruction in his native city and in Lodi, he entered the Conservatorio Giuseppe Verdi in Milan, where his teachers were Andreoli (piano), Balli (harmony), and Ferroni (composition). He became more widely known through his opera, *Anima Allegra* (Rome, 1921; New York, 1923), the text of which Illica had originally written for Puccini. Two other operas, *Marc di Tiberiade* and *Sirenetta*, had not yet been produced in 1924. He also wrote a considerable amount of church music

VIVIANI, RENÉ (1863–1925). A French statesman (see VOL. XXIII). He was prime minister of France when the War broke out, and resigned in October, 1915, afterward becoming minister of justice in Briand's cabinet and later holding the same office in the cabinet headed by Ribot He visited the United States twice, first in 1917 as the head of the French Commission sent for the purpose of influencing the American people to help in the War, and the second time in 1921, when it was reported that he had come to advise the United States to join the League of Nations, but he stated that it was merely a "courtesy visit." In 1920 he was appointed French delegate to the League of Nations.

VLADIVOSTOK. See SIBERIA AND FAR EASTERN REPUBLIC

VOCATIONAL EDUCATION. See EDUCATION IN THE UNITED STATES.

VOCATIONAL REHABILITATION. See AGRICULTURAL EDUCATION

VOLK, DOUGLAS (1858–). An American painter (see VOL. XXIII). He painted several important war portraits, including those of General Pershing, King Albert, and Lloyd George, in the National Gallery, Washington (1921). In 1915-16 he received the Beck Gold Medal of the Pennsylvania Academy and a gold medal from the National Arts Club, New York City. His powerful portrait of Lincoln (1923) was acquired by the Albright Art Gallery, Buffalo, N. Y.

VOLKELT, JOHANNES IMMANUEL (1848–). A German philosophical writer (see VOL. XXIII). He published, after 1914, *Gewisshert und Wahrheit* (1918), *Religion und Schule* (1918); and *Das Aesthetische Bewusstsein* (1920).

VOLSTEAD, ANDREW J. (1860–). An American public official, born in Goodhue County, Minn., and educated at St. Olaf's College and Decorah Institute In 1884 he was admitted to the bar and practiced law at Granite Falls, Minn He was for 14 years county attorney of Yellow Medicine County. In 1903 he was elected to Congress and was successively re-elected until 1922, when he was defeated. He was the author of the Volstead Act for the enforcement of the Federal prohibition amendment. See PROHIBITION.

VOLUNTEERS OF AMERICA. A Christian, philanthropic, benevolent organization, under the presidency of Gen. Ballington Booth. It was incorporated in 1896 While its government is modeled on the United States Army, yet its rules and regulations are made by the Grand Field Council composed of officers of and above the rank of major. The Volunteers of America is established in more than 100 of the principal centres of America. Some idea of the scope and polity of the Volunteers may be gleaned from the report of its 1920–24 work. Volunteer philanthropic homes and institutions provided 801,511 free lodgings and 1,361,619

lodgings paid for in cash and by work, a total of 2,163,130 lodgings. During this term 1,105,986 meals were paid for in cash and by employment, and 2,416,848 were given free, a total of 3,522,834 meals. Assistance was given 208,529 persons and families in desperate circumstances, apart from the aid just mentioned. Employment was found for nearly 90,000 persons, many of whom were practically stranded; 386,610 garments and pairs of shoes were provided for the very poor and needy. In addition, 196,553 families were assisted in connection with the Volunteer missions. The Fresh Air Camps received 160,768 mothers and children, and many hundreds of children remained in these health-giving surroundings for two or three weeks at a time. There was a marked increase during the holiday and Christmas seasons in the work among the destitute; hundreds of thousands of special dinners and provisions were sent into the homes of families who would otherwise have spent cheerless holiday seasons.

The attendance at the Volunteer services reached 4,308,211; at outdoor services it numbered 9,797,562, making a total congregation of 14,105,773. During this period it is estimated that over 10,000 prisoners returning to freedom from the State prisons were helped to a new chance in life Over 100,000 men within the walls of State prisons have become members of the Volunteer Prison League since its inauguration by Mrs Ballington Booth. During the War, 326 of the commanding officers of the Volunteers, together with their associate workers, were sent to the front. These volunteered in different capacities, some with the Red Cross, some with the Young Men's Christian Association, some as chaplains, and others for work in canteens. A number of the most efficient surgeons from the Volunteer Hospital in New York saw service overseas, and so did many nurses. In the United States, Volunteer Service Clubs were organized, providing entertainment, reading- and writing-rooms, sleeping accommodations, baths, etc. The *Volunteer Gazette* is the official organ, and national headquarters are maintained in the Volunteers' own building in New York City.

VORARLBERG. A province of the Republic of Austria. Its area was 1004.6 square miles. Its population in 1910 was 145,408; in 1923, 139,968. See AUSTRIAN REPUBLIC; SWITZERLAND.

VORONOFF, SERGE (?–). A French surgeon who divides with Steinach and Lydston such credit as lies in the introduction of grafting of the sexual glands with the aim of rejuvenating the senile and presenile invalid. He is a graduate of the University of Paris and visiting surgeon to the Russian Hospital in that city. He also is director of experimental surgery in the physiological station of the Collège de France and of the biological laboratory of the Ecole des Hautes Etudes. He has published four works on gland grafting: *Vivre; Etudes des Moyens de Relever l'Energie Vitale* (1920), translated into English by Mme. Voronoff, *La Glande Génitale Male,* in collaboration with Retterer (1921); *Greffes Testiculaires* (1923), and *Quarante-trois Greffes du Singe à l'Homme* (1924). See SECRETIONS, INTERNAL.

VORSE, MARY HEATON (MRS. ROBERT MINOR) (?–). An American author born in New York City, and educated abroad. Her most successful book was *The Prestons* (1918), picturing American family life. Her other works include: *The Breaking In of a Yachtsman's Wife* (1908); *The Very Little Person* (1911); *The Autobiography of an Elderly Woman* (1911); *The Heart's Country* (1913); *I've Come to Stay* (1919); *Growing Up* (1920); and *Men and Steel* (1921).

VOUGHT, CHANCE MILTON (1888–). An American consulting engineer, born in New York City, and educated in New York and at the University of Pennsylvania. He was an active pilot (1911–17) and designed and constructed the *PLV* biplane, Mayo biplane, Simplex three-place flying-boat, Wright model *V* military biplane, Wright-Hispano flying-boat, Vought *VE7* standardized military training biplane, *VE8* single-seated pursuit plane, *VE10* short-hull flying-boat *VE7SE*, Navy standard ship's turret plane, *VE9* advanced training airplane, and *VE11* special pursuit single-seater (1910–21) During the War he was consulting engineer of the Bureau of Aircraft Production at Washington.

W

WABASH COLLEGE. A college for young men at Crawfordsville, Ind., founded in 1832 The student enrollment increased from 329 in 1914 to 496 in 1923, the faculty from 16 to 27 members and the library from 50,000 to 61,000 volumes. The endowment increased from $725,000 to $1,200,000, and in 1923 the income of the college was $110,000. President, George Lewes Macintosh.

WADE, LEIGH (1896–) An American airman, born at Cassopolis, Mich He was for a time with the Royal Flying Corps at Toronto, Canada. In 1918–19 he was at headquarters of the technical section of the Air Service in Paris (France); later he was test pilot at McCook Field. In 1921 he was pilot on the White Mountain photographic mission and in 1924 one of the pilots of the American round-the-world flight. His plane was put out of action on the flight between the Orkney Islands and Iceland after completing 19,000 miles of the trip.

WADSWORTH, JAMES WOLCOTT, JR (1877–). An American legislator (see VOL XXIII). He was elected to the United States Senate from New York State in 1914 and was reëlected in 1920 for the term ending 1927. In the Senate he was chairman of the Military Affairs Committee and a member of the Committees on Foreign Relations, Library, and Elections.

WAGES. Nominal wages have increased markedly in all countries since 1914, whether comparison is based on wage rates or actual earnings As far as can be determined from available statistical data, the relative increase has been especially great in the case of wages of unskilled workers and has made their remuneration in most countries more nearly like that of skilled workers than before the War. Among skilled workers there has been considerable variation in the rate and amount of increase in wages; the increase was at first most noticeable in the wages of war workers, and not until later in the wages of those in the building and other trades where production was not actively stimulated until the postwar period In the United States the changes shown in the table in the union scale of wages and hours are shown

Year	Rate of wages per hour	Full-time hours per week	Rate of wages per week, full-time
1913	100	100	100
1914	102	100	102
1915	103	99	102
1916	107	99	106
1917	114	98	112
1918	133	97	130
1919	155	95	148
1920	199	94	189
1921	205	94	193
1922	193	94	183
1923	211	94	199

in the index numbers of the United States Bureau of Labor Statistics; these indexes are based on some 5000 quotations of the union scale in operation on May 15 of each year, in 12 groups of trades and occupations in 66 cities, and they are weighted according to the number of workers in the trades.

Within this same period the average earnings of factory workers in New York State varied as follows, according to the index number of the New York State Industrial Commission; the base here was the average earnings in June, 1914.

Year	Average earnings
1914	98
1915	101
1916	114
1917	129
1918	160
1919	185
1920	222
1921	203
1922	197
1923	214

Obviously, an index number showing changes in wage rates will not reveal differences in total wages from overtime work, unemployment, and underemployment, and corrections for such differences have to be made before the index number can be used to show changes in "real wages." Such corrections are not necessary in an index number based on earnings, but the irregular increases in the wages of different types of employees late in the decade 1914–24 bring quite different results in the data as combined in an index number according to the type of workers included, a large proportion of unskilled workers making the index number show a large relative increase since 1914, and vice versa. If, however, comparison is made between these and other indexes for wage changes in the United States, and the index of the cost of living (see COST OF LIVING), it is found that for most workers, no matter what type of wage figures are used, the cost of living increased more rapidly than wages through 1920; the exception was unskilled workers and certain war workers whose "real wages" as well as actual wages began to increase in 1917 and 1918. After 1920 the cost of living decreased more rapidly than wages, so as to give most workers increased purchasing power in comparison with 1914 Similar trends are shown by the wage statistics in Great Britain and also in other countries where there is sufficient information on both wages and living costs to warrant attempting to determine changes in "real wages."

An interesting computation of "real wage" index numbers with and without allowing for unemployment is given in *Bulletin No. 2* of Series N of the International Labor Office (Geneva), entitled *Methods of Statistics of Wages and Hours of Labor* (December, 1923).

The figures are from the Australian Commonwealth Bureau of Census and Statistics, and the general method is that in use in Australia. the cost of providing the items listed in a quantity budget for a family of specified size. See articles on European countries for discussions

Date	Full time weekly wage rate index	Percentage of unemployed	Weekly wage rates index numbers (*Calc from cols. I and II*)	(*Recalc. 1911 = 100*)	Cost of living index number	Real wage index number (*Full-time*)	(*Allowing for unemployment*)
	I	II	III	IV	V	VI	VII
1911. . .	100	4 7	95.3	100	100	100	100
1914	108 5	11.0	96 6	101.4	114.0	95.2	88.9
1917 ..	125 2	7.4	115 9	121 6	131.8	95 0	92.3
1920... ...	175.2	7 8	161 5	169 5	178 5	98 2	95 0
1921	184.4	9 5	166 9	175 1	169 7	108 7	103.2

This table also illustrates the danger of drawing wrong conclusions about the improvement in the wage conditions of the working classes, if comparison is made only with reference to the rather unsatisfactory economic conditions prevailing in 1914. Even in comparison with earlier periods, however, it seems to be indicated that wages, especially at the minimum levels, had in 1924 a higher purchasing power, making possible the maintenance of a somewhat higher standard of living That many wages were still below the amount necessary for the maintenance of a satisfactory standard of living is plainly evident from a comparison of 1924 wages with the amounts estimated in various quantity budgets as essential for the maintenance of such a standard.

Because of the frequency of wage changes toward the end of the decade, much attention was given to the best means of securing fair and equitable adjustments During the time of rapidly increasing prices, wages were often increased in accordance with changes in a cost-of-living index number, the increase occurring automatically in some instances with any change of an agreed number of points in the index number, while in other instances each change was a matter of special agreement between employer and employee Quantity budgets were also used frequently as the basis for wage determinations, and emphasis was placed on the importance of considering the cost of maintaining a specified standard of living under specified conditions rather than depending entirely on data showing the increased cost of maintaining a standard which might or might not have been adequate at an earlier period Probably the most significant and permanent changes in methods of wage determination followed the war-time emphasis on uniform standards for wages for similar employment throughout large areas, thus breaking down earlier standards which created many minor variations in different localities and different industries not justified under existing economic conditions. Another important change in attitude came also from the emphasis on "payment for results" in connection with wage determination, engendered by the bonuses and other special systems of extra remuneration for production above a specified amount, and apparently entering into discussions of wages to an increasing extent. A new development in several European countries was the payment of a "family wage," i e. special rates to married men and sometimes an extra grant for each child. Such a system was also strongly advocated in Australia as preferable to a rate for all men workers which assumes the necessity of the support of a family, as has been customary in wage decisions related to of wage tendencies abroad. See also the articles LABOR ARBITRATION; LABOR LEGISLATION; RAILWAYS.

WAGSTAFF, BLANCHE SHOEMAKER (1888–). An American author, born in New York City, and educated at the Brearley School and Miss Spence's School in New York. During the War she acted as chairman of the National Woman's Service League and assisted in the War Camp Community Service and other organizations. Her writings include *Song of Youth*, poems (1906), *Woven of Dreams*, poems (1907); *Atys* (1909), *Alkestis*, a Greek drama staged at the Hudson Theatre in New York City (1911); *Eris*, a drama (1913); *Narcissus* (1917); *Book of Love* (1917); *Leaves in the Wind*, poems (1920)

WAHABITES. See ARABIA; PAN-ISLAMISM

WAHL, ADALBERT EMIL AUGUST (1871–). A German historian (see VOL. XXIII). In 1914 he published *Beitrage zur Geschichte der Konfliktszeit*, and in 1920, *Vom Bismarck der Siebziger Jahre.*

WAINWRIGHT, JONATHAN MAYHEW (1864–). An American lawyer, born in New York City, and educated at Columbia University and its law school. In 1886 he was admitted to the bar and has since been in practice in New York City During 1902–08 he was a member of the New York Assembly, and during 1909–13, of the New York Senate In 1921 he was appointed by President Harding Assistant Secretary of War, a post which he resigned in 1923 when he was elected a Congressman from the 25th New York District During the War he was a division inspector with the rank of lieutenant-colonel in the 27th Division and served throughout the entire war in the United States, France, and Belgium, and was not mustered out until March, 1919. The United States conferred on him the Distinguished Service Medal He also received the Legion of Honor from France and the Croix de Guerre with palm from Belgium.

WALES. See GREAT BRITAIN.

WALKER, STUART (?–). An American playwright, born at Augusta, Ky., and educated at the University of Cincinnati. He was play reader, actor, and stage manager for David Belasco (1909–14) and in 1914 became stage director for Jessie Bonstelle. He became an independent producer in 1915 and directed the Repertory Company in Indianapolis from 1917 to 1921. He was the originator of the Portmanteau Theatre and wrote: *Portmanteau Plays* (*The Trimplet, Nevertheless, The Medicine Show, Six Who Pass While the Lentils Boil*, 1917) and *More Portmanteau*

Plays (*The Lady of the Weeping Willow Tree, The Very Naked Boy, Jonathan Makes a Wish,* 1919).

WALKER, WILLIAM HULTZ (1869–). An American chemist (see VOL. XXIII). He was lieutenant-colonel in the National Army during the War, chief of the Chemical Service Section, and later a colonel in the United States Army in charge of the Gas Offense Division. In 1919 he was awarded the Distinguished Service Medal.

WALLACE, HENRY CANTWELL (1866–1925). An American public official, born at Rock Island, Ill, and educated at the Iowa State College of Agriculture. He engaged in farming in Iowa from 1887 to 1891, taught for a while in the Iowa State College of Agriculture, and was associated editorially with *The Creamery Gazette, Farm and Dairy* (1893–95), and *Wallace's Farmer* (1895–). During the War he was a member of numerous organizations such as the National War Work Council of the Young Men's Christian Association. In 1921 President Harding appointed him Secretary of Agriculture. His work in the department was considered highly satisfactory.

WALLACHIA. See RUMANIA.

WALLIN, J(OHN) E(DWARD) WALLACE (1876–). An American psychologist, born in Page County, Iowa, and educated at Yale University. He began teaching psychology at Clark University in 1901, went to the University of Michigan in 1902, and from 1903 to 1906 was demonstrator in experimental psychology at Princeton University. The Mellon Institute engaged him as psychologist on smoke investigation (1912–13), and in 1921 he was made director of the bureau of special education at Miami University. His writings include: *Researches on the Rhythm of Speech* (1902); *Optical Illusions of Reversible Perspective* (1905); *Experimental Studies of Mental Defectives* (1912); *The Mental Health of the School Child* (1914); *Measurement of Mental Traits in Normal and Epileptic School Children* (1923).

WALPOLE, HUGH (SEYMOUR) (1884–). An English novelist (see VOL. XXIII). He served with the Russian Red Cross during 1914–16. His later publications include: *The Golden Scarecrow* (1915); *The Dark Forest* (1916); *Joseph Conrad* (1916); *The Green Mirror* (1918); *The Secret City* (1919); *Jeremy* (1919); *The Captives* (1920); *The Thirteen Travellers* (1921), *The Young Enchanted* (1922), *The Cathedral* (1922); *Jeremy and Hamlet* (1923), and many stories and articles in magazines.

WALSH, JAMES JOSEPH (1865–). An American physician and author (see VOL. XXIII). Dr Walsh has written a number of books since the War on his favorite subjects of medical history and biography, psychotherapy, and the accomplishments of the Roman Catholic scientists. These comprise *Health through Will Power* (1919); *History of Medicine in New York* (1919), *Mediæval Medicine* (1920); *Religion and Health* (1920), and *Cures: the Story of Cures that Fail* (1923)

WALSH, THOMAS JOSEPH (1873–). An American Roman Catholic bishop, born at Parker's Landing, Butler Co., Pa. He studied at the College and Seminary of St. Bonaventure and in Rome, and was ordained to the Roman Catholic priesthood in 1900. He served as assistant director at St. Joseph's Cathedral in Buffalo until 1900, and from that year until 1915 he was private secretary to Bishops Quigley and Colton. He also acted as chancellor of the diocese. From 1915 to 1918 he was director of St. Joseph's old Cathedral in Buffalo. He was consecrated bishop of the diocese of Trenton, N. J., in 1918.

WALTER, BRUNO (1876–). A German conductor, born in Berlin. He was trained at Stern's Conservatory, where his teachers were Ehrlich, Bussler, and Radecke. After short periods as conductor in Cologne, Hamburg, Breslau, Presburg, Riga, and Berlin he rose rapidly to a position of preeminence through his brilliant work at the Hofoper in Vienna (1901–13). In 1914–22 he was Hofkapellmeister and Generalmusikdirektor in Munich, succeeding Felix Mottl. He made extensive tours as a guest conductor and in 1923 visited the United States, where his appearances with the New York Symphony Society and the Boston, Minneapolis, and Detroit Symphony Orchestras made a profound impression. His compositions include two symphonies; *Das Siegesfest* for soli, chorus, and orchestra; a piano quintet; a piano trio; a string quartet, and a violin sonata.

WALTER, HERBERT EUGENE (1867–). An American zoologist, born at Burke, Vt., and educated at Bates College, Brown and Harvard Universities, and at Freiburg He was an instructor in biology in the Chicago high schools (1894–1904); assistant at Harvard (1904–06); assistant professor (1906–13) and associate professor of biology (1913–) at Brown University; and instructor in field zoology (1906–17), and assistant director (1917–) at Cold Spring Harbor. He published *The Human Skeleton* (1918) and *Genetics*, 2d ed (1923).

WALTON, JOHN CALLOWAY (?–). A governor of Oklahoma. He was elected in November, 1922. His inauguration on Jan. 11, 1923, was distinguished by an immense barbecue. He immediately began a bitter fight against the Ku Klux Klan, which he charged with Statewide floggings, riots, and crimes. On his suppression of newspapers opposed to him, the editors of the State issued an appeal to the nation They accused the Governor of usurpation of power and attempting to nullify the State constitution. The Legislature also opposed him, and in order to carry his measures he proclaimed martial law and called out 100,000 men to enforce it. The reign of martial law ended October, 1923, and on October 23, the Governor was suspended by the State Senate On the following November 20 he was removed from office by impeachment.

WANAMAKER, (LEWIS) RODMAN (?–). An American merchant, son of John Wanamaker He graduated from Princeton in 1886 and was from that time associated in business with his father as vice president of the John Wanamaker stores in New York and Philadelphia. He was also a director and official of many financial institutions. For several years he was consul general at Philadelphia for Paraguay and other South American countries. He financed three expeditions to the West to study Indian life and presented several art collections to Princeton University. During the War he served as chairman of the Mayor's Committee in New York to Welcome Homecoming Troops and was also chairman of the Mayor's Committee on Public Welfare and of the Committee on the Reception of Distinguished

Guests. He received decorations from several foreign countries. Following the death of his father in 1922, he became head of the Wanamaker business.

WAR, DIPLOMACY OF THE. War has been defined as the last resort of diplomacy; it is also true that diplomacy is the handmaid of warfare. Diplomatic manœuvres, that is to say, are necessary to support armies and navies, and the inverted maxim, "In time of war prepare for peace," is truer than in its original form The magnitude of the World War, its long duration, the number of belligerents, and its far-flung consequences necessitated diplomacy on a scale almost spectacular, and contrary to the experiences after previous conflicts, the world has hardly had to wait at all for a tolerably adequate diplomatic history of the period 1914 to 1918. Even during the War itself, parliaments held secret sessions in order that executives might quiet the alarms of the legislative representatives not only as to military situations, but as to diplomatic policies. Following the peace settlement, all sorts of disclosures were made, in official collections of diplomatic documents published by Foreign Offices; in memoirs by diplomats and generals who were concerned about their own reputations and wished to increase their incomes by large royalties; and in the revelations of the Russian revolutionary governments which were anxious to discredit the secret diplomacy of Europe and to strengthen their own argument that modern parliamentary institutions are bankrupt.

Elaborate efforts were made during the War to bring neutrals into the conflict. Discussions were carried on between the members of each group of powers involved as to their war aims and peace terms. Territories in the possession of the enemy were allocated in secret treaties at the same time that there was a brave show of appealing to the people in order to persuade them to accept the ideals and aims which, in public, statesmen professed to be fighting for. Negotiations for peace were conducted while the military situation was stable, and neither group of powers approached exhaustion. Some of these negotiations have been adequately disclosed. Other informal conferences and whispered words were more vital to the world than speeches. In some such cases the pertinent facts have only been meagrely hinted. But it is certain that in the future the question whether peace was missed and whether the War could have been ended before 1918 will be debated as violently as the question of the responsibility for the outbreak of hostilities in August, 1914. Some declarations of war were made without negotiation but were nevertheless slightly delayed. Austria declared war on Serbia July 28 but remained at peace with Russia until August 6. France and Great Britain declared war on Austria on August 10 and 12, but until August 27 Austria was in peaceable relations with Belgium so far as a formal declaration was concerned. Turkey, Japan, and Italy at first remained neutral. They began hostilities later, after mature deliberation. At first, the other Balkan states too were not directly affected. Both the Central Powers and the Entente made strenuous efforts to win over these neutrals or at least to keep them from joining the other side.

Japan. The Anglo-Japanese Alliance, the terms of which were known, seemed to make Japanese support of England inevitable. When hostilities began, the British Ambassador to Japan asked Baron Kato, the Japanese Foreign Minister, whether Japan would aid England The Cabinet Council was at once summoned, and the next day (Aug. 4, 1914) the Ambassador was told that Japan would not evade her responsibilities Three days later the British Ambassador told Baron Kato that the situation had developed in such a manner as to require Japan's immediate entrance The same day Premier Okuma called a meeting of the Genro, "the elder statesmen," and at this conference, it was said, Japan's policy was "definitely formulated" (Kawakami, *Japan in World Politics*, p. 256; New York, 1917). But on August 12 Marquis Okuma still talked of Japan's desire for peace and of the possibility of its being gratified. Japan issued an ultimatum to Germany on August 15, demanding the recession of Shantung, the dismantling of the Tsing Tau forts, and the departure of German warships from Chinese waters. A favorable answer to this ultimatum might have served to keep Japan out of the War, and in view of this possibility the phrase "in accordance with her obligations under the Anglo-Japanese treaty," which was used in the ultimatum, seems rather misleading. Germany rejected the demands, and war was declared. But Montenegro was brought in automatically by the attack on Serbia; the Russian threat against Austria determined Germany's position; the implication of Russia made France's course inevitable, so binding were the European alliances considered. On the other hand, Great Britain's entanglement only required an ultimatum by Japan to Germany, and Japan entered the War three weeks late. The delay had far-flung consequences, such as "the bombardment of Madras, the sinking of a new Blue Funnel liner with £1,000,000 worth of rubber in the Arabian Sea, the annihilation of Sir Reginald Craddock's squadron, with its gallant crews, and the Battle of the Falkland Islands." The Japanese Parliament was summoned in special session Sept. 3–9, 1914, to give its formal authorization for the expenses already incurred for the Tsing Tau expedition and to sign a blank check for additional outlays.

Turkey. The next power to come in was Turkey. There was no hope that the Young Turks would support the Entente, but on the other hand, there seemed a chance that war could be avoided with a power which had always considered one of its interests to be the maintenance of the Turkish Empire. England made promises. If Turkey would remain neutral, the status of Egypt would not be altered; the Entente would protect Turkish independence; the Capitulations would be abolished; and George V expressed to the Sultan his personal regret that Great Britain had commandeered (August 3) two battleships which were being built in England for Turkey. But on August 1 a treaty had been signed between Germany and Turkey. The latter was guaranteed territorial integrity against Russia Mobilization proceeded, and on October 28 Turkey began naval operations. Three days later Russia declared war. Great Britain annexed Cyprus, and on December 17 she proclaimed a protectorate over Egypt But the political effects of Turkish hostilities were much greater than these. The full participation of India was assured. Mes-

opotamia, Palestine, Syria, and Arabia became side shows for the main tent on the European front. In respect of Entente war aims, the entrance of Turkey was of tremendous importance. Russia saw the possibility of realizing her ambitions. As early as November, 1914, she was informed that she might have the Straits. On Mar. 4, 1915, Sazonoff demanded Constantinople, the western coast of the Bosphorus, the Marmora, and the Dardanelles; part of Thrace; the coast of Asia Minor between the Bosporus and the river Sakaria; and islands in the Sea of Marmora. France and Great Britain agreed in general, if their own claims were satisfied; and thus there began a long series of demands and counterdemands for compensations and satisfactions, which were embodied in the Secret Treaties. These agreements were of a piece with the *Realpolitik* against which the Entente professed to be fighting; the secret ambitions were quite inconsistent with the war aims which were publicly professed. They were, moreover, ambitions which had extremely bad effects in the Balkans. In the eyes of Greece, Bulgaria, and Rumania, Turkey might really stand for Balkan independence. The Entente protection of "small nations" apparently was applicable only to Belgium. The little states of the Balkans were to be devoured by Russia.

Italy. The resources of the Entente were greatly increased six months later when Italy entered the War She had declared her neutrality on Aug. 1, 1914, on the ground that intervention was not demanded by the terms of the Triple Alliance. Vienna, pressed by Berlin, had consented to cede the Trentino and the west bank of the Isonzo. Concessions had also been promised in Trieste and Albania. But these were not sufficient. There was much Italian sympathy for Belgium and Serbia. Sonnino saw that he could make the Central Powers and the Entente bid against each other. Prince von Bülow was called from retirement and was sent to the scene of his former diplomacy to lend his efforts to keeping Italy neutral. Burian succeeded Berchtold as Austrian Foreign Minister, and the concessions were slightly increased. But Sonnino feared both a Teutonic and Jugo-Slav dominance in the Adriatic; one of these results seemed inevitable whether the Entente lost or won, and if the War ended in a draw, the veteran Italian statesmen believed that more could be expected from the Entente, whose statesmen were continually increasing their demands. France and Russia considered the Italian claims exorbitant. The latter particularly objected to the sacrifice of Serbian designs on the eastern coast of the Adriatic. But the diplomacy which looked to the resettlement of Europe was so universally selfish that the Powers could hardly object, when their own interests were not involved, to selfishness in each other. The situation on the western front, moreover, operated in favor of Italy. The Allies were repulsed at Neuve Chapelle and Ypres; the shortage of high explosives was becoming known. Consequently the Entente and Italy on Apr. 26, 1915, signed the Treaty of London. It promised Italy, in addition to the Austrian sacrifices, the southern Tirol to the Brenner Pass, Gorizia, Trieste, Istria, and northern Dalmatia.

Ribot is said to have remarked after a conference with the Italian representatives: "We are lucky that they didn't take our clothes away from us." In return for the high price paid by the Entente, Italy promised to begin hostilities within a month and to prosecute them with all her resources. She pledged herself also to sign the Declaration of London of Sept. 5, 1914, by which the Allies promised that they would not make peace separately.* Adhesion was not given until Nov. 30, 1915, although the Triple Alliance was denounced on May 3 and war was declared on Austria on May 23. Italy was technically at peace with Germany until Aug. 27, 1916. The terms of her entrance, furthermore, pledged the Allies to support Italy in preventing the Pope from acting to bring about peace or to settle any questions arising from the war. The only excuse for the treaty was "the familiar plea of necessity," according to Professor Gooch. "Though it increased the material strength of the Grand Alliance, it diminished its moral authority; and Serbia learned within a week of the pact which had disposed of Jugo-Slav territory behind her back." "The French and ourselves were fighting for our lives on the western front," Mr. Asquith said in apology; "and the treaty represented the terms on which Italy was prepared to join forces."

Bulgaria. Greece, Bulgaria, and Rumania now began to be drawn into the conflict. Immediately after the outbreak of the War, Venizelos promised that if the Entente would guarantee Greece against a Bulgarian attack, he would assist them in the event of Turkey's joining the Central Powers. King Constantine on the other hand announced that he would not attack Germany's allies before they attacked him. In December, 1914, the Entente offered South Albania, with the exception of Valona, and in January, 1915, Smyrna, in return for Greek intervention. Venizelos urged that an army corps be sent to Gallipoli; Constantine seemed to be willing. But he changed his mind on the advice of his General Staff, another example of the supremacy of military authorities over the politicians; and Venizelos resigned

Meanwhile the Allies had been negotiating unsuccessfully for Bulgaria. Noel Buxton, an authority on the Balkans, told Sir Edward Grey early in August, 1914, that armed neutrality might be secured from Bulgaria by a revision of the Treaty of Bucharest and a loan. Sazonoff urged that Bulgaria be given territory in Macedonia, for her position was important. The Central Powers would get full benefit from the Turkish Alliance only if they were joined by Bulgaria. On the other hand if the Entente succeeded in luring Ferdinand, communication with Russia from the Mediterranean would be secured, and Turkey would be cut off. In 1915, when Russia suffered severe defeats in Poland and Galicia and the attack on the Dardanelles proved unsuccessful, the Entente saw that they must offer Bulgaria real compensations. On August 23, under pressure from the Entente, the Serbian *Skuptshina* consented to territorial "sacrifices indispensable for the preservation of the vital interests of her people"; but it was too late. Serbia, indeed, wished to attack Bulgaria; but this, in the opinion of the Entente, would absolve Greece from her treaty obligation to go to the support of Serbia if the latter were attacked by Bulgaria. Ferdinand had by now decided that the Central Powers would win, and he wished to be one of the victors. In

September a military convention was signed. Germany and Austria promised to send 12 divisions against Serbia. Belgrade was entered on October 9, and two days later the Bulgarians crossed the frontier. Venizelos, in office again, promptly asked Great Britain to send 150,000 men and proposed that Greece fulfill her obligations under the treaty with Serbia. Even though Great Britain offered Cyprus for Greek intervention, Constantine determined to maintain neutrality and dismissed Venizelos. Serbia regretted that she had not been permitted to attack two months before; she was in a desperate position and without the support of Greece. Allied diplomacy in the Balkans had certainly failed; Sir Edward Carson resigned from the British cabinet in protest, and Sir Edward Grey may have been correct but was hardly reassuring when he said in a speech on October 14 that diplomacy could succeed only if supported by striking military successes.

Rumania. A year later Rumania, the fifth Balkan state to forsake neutrality, added her forces to those of the Allies after two years' flirtation. Rumania was bound to the Central Powers by a treaty concluded in 1883, but when the Kaiser and the Austrian Emperor promised to assist in obtaining Bessarabia for Rumania if she would join, King Carol discovered that he would not be permitted to fulfill his pledges. In September, 1914, Rumania signed treaties with Russia and Italy and promised benevolent neutrality. In January, 1915, a British loan was negotiated; in February the Italian agreement was renewed. When Italy left the Triple Alliance in May, 1915, Rumania announced her territorial demands, but they were too high. A year later Brusiloff's smashing blow on Austria led Germany to press for concessions to Rumania as the price of her continued neutrality, but Burian refused to yield. Again the Western Front forced the Allies to engage in the Balkan auction. On August 18, a secret treaty gave Rumania the Banat, Transylvania, and the Bukovina to the Pruth—one of the most indefensible ethnical arrangements of the war. Rumania declared war on August 28, but the time was unfortunately chosen. Military secrets had been betrayed; Rumania disregarded Entente advice in attacking Transylvania instead of Bulgaria, although from her own standpoint there was some justification for this policy; the Entente underestimated the forces that Germany could spare; Russian support was meagre and ineffective. Rumania was crushed.

The United States. Immediately on the outbreak of the War, the use of sea power by Great Britain and Germany raised controversies with neutrals, particularly the United States. German commerce was practically driven from the seas, and the United States began to discuss questions of international law relating to British restrictions on American commerce with Germany, and the ever-increasing American trade in munitions, practically all of which went to the Allies. The United States' professed willingness to sell to Germany was only a gesture, since the British navy determined the identity of the purchasers. A war zone was declared by Great Britain on Oct. 13, 1914, when an Admiralty announcement said that His Majesty's government had authorized a mine-laying policy in certain areas and that it would be dangerous for ships to cross these limits. Three weeks later notice was given that "the whole of the North Sea must be considered a military area." Ships were warned that they would "be exposed to the gravest danger from mines which it has been necessary to lay." Against this action the United States entered no protest, but England's command of the seas enabled her to afford pilots to American ships and to reduce to a minimum the possibility of disaster so far as the mines laid by her were concerned. The German "war zone" decree which marked the beginning of the controversy with the United States was of a more sinister character.

Submarine Warfare.—Late in 1914 Admiral von Tirpitz said that the submarine would be used to sink merchant vessels in British waters, but the rules of international law enumerating the exceptional cases in which prizes might be destroyed, the safety of passengers and crew always being a sine quâ non, were so definite, and the considerations of humanity so potent, that such a method of warfare seemed highly improbable. On Feb. 4, 1915, Germany issued a proclamation declaring "the waters surrounding Great Britain and Ireland, including the whole English Channel," to be a "war zone," and threatening the destruction of "every enemy merchant ship in the said war zone . . . without its being always possible to avert the danger" to passengers and crews. Neutral ships were also given a warning. This proclamation was justified as a retaliatory measure for Great Britain's interferences with German trade. Later (March, 1916) the ground of defense was shifted, and it was claimed that the use of the submarine against merchant vessels could not be illegal, because, the weapon being a new one, there were no rules on the subject. Against this announcement the United States, with other neutrals, protested vigorously. There was sent to Germany the celebrated "strict accountability" note of Feb 10, 1915. Then followed a discussion of points of international law. Germany threw out the hint that if the Allies could be persuaded to adhere to the Declaration of London, she might withdraw her submarine and war zone order, and it is likely that at any time during the War she would have been willing to make this concession if permitted to import foodstuffs and if the trade in munitions between the United States and the Allies had ceased. Accordingly Secretary of State Bryan sent on February 20 to Great Britain and Germany identical communications, asking for mutual concessions so that an international modus operandi might be achieved which would not be fraught with such menaces to neutrals. No agreement proved possible.

The Lusitania.—American rights were first infringed by Germany on Mar. 28, 1915, when the British steamer *Falaba* was sunk by a German submarine, and an American citizen was drowned. On May 1 the American vessel *Gulflight* was torpedoed by a submarine, and three American citizens met their death. Finally, on May 7, the *Lusitania* was sunk without warning, and more than 100 American citizens lost their lives. Before a protest could be made, two communications were received from Germany. The first expressed "deepest sympathy at the loss of lives on board the *Lusitania*" but maintained that the responsibility rested with the British government, which, through its plan of starving the civilian population of Germany, had forced Germany to resort

to retaliatory measures. The practice of arming British vessels made it impossible to treat them as merchant ships; and Germany regretted that Americans felt "more inclined to trust to English promises than to pay attention to warnings from the German side." In the second communication Germany explained that instructions had been issued to avoid attacks on neutral ships, and that in the event of an unfortunate accident regret would be expressed and damages afforded. On May 13 the United States sent Germany the first of a long series of notes. The legal questions were argued; the German excuses were answered, and the United States promised that it would not "omit any word or act necessary to the performance of its sacred duty of maintaining the rights of the United States and its citizens and of safeguarding their free exercise and enjoyment." Whether the *Lusitania* was armed, the principles of humanity involved, and the justification of the submarine warfare as a reprisal for England's extensions of international law were argued. Against the English orders in council to extend contraband lists and to intercept shipments destined for neutrals because of a possible ultimate German destination, the United States was protesting at the same time that it carried on the submarine controversy with Germany. As Ambassador Page's letters and Count Bernstorff's despatches showed, President Wilson would have made these protests stronger if the German infractions of international law, causing loss of life, had not always kept American public opinion from being singly concerned with interferences with trade.

While the *Lusitania* case was being argued, the American steamer *Nebraskan* was torpedoed off the coast of Ireland; several Americans on the British steamer *Armenian* lost their lives on June 28; two Americans were killed when the *Arabic*, bound for New York and hence carrying no contraband, was torpedoed without warning on August 19. Finally, on September 1, Ambassador Bernstorff gave this pledge: "Liners will not be sunk by our submarines without warning and without safety of the lives of noncombatants, provided that the liners do not try to escape or offer resistance."

Trade in Munitions.—The *détente* resulting from this was used for a discussion of the trade in munitions, which had grown to large proportions. Germany's record in the past as an exporter of munitions and her controversy over submarines made it inadvisable for her to protest; so in June the Austro-Hungarian government sent the United States a strong note against the continued trade in munitions. Secretary Lansing answered on August 12 with an able argument covering all phases of the question, but by this time the American attitude was being influenced by considerations other than international law. Impeccable legality was supported by sympathy with the Allies. The invasion of Belgium, the *Lusitania* and other sinkings, the alleged atrocities, and Germany's evasive answers to Wilson's submarine notes, all helped to determine the American position.

Austria-Hungary now entered the submarine controversy. The Italian liner *Ancona*, bound from Naples to New York, was torpedoed in the Mediterranean without warning, and American lives were lost. After several interchanges, Germany's ally accepted the principle that "hostile private ships, insofar as they do not flee or offer resistance, may not be destroyed without the persons on board having been placed in safety." But satisfaction with the theoretical agreement was short-lived. Three other passenger steamers were sunk in the Mediterranean, and Count Bernstorff, on Jan. 7, 1916, came to the fore with renewed pledges. Ships would be destroyed "only after passengers and crew have been accorded safety." Now the controversy shifted again, this time to the question of armed merchantmen. In the early part of 1916, Italian and British ships were armed on account of the ruthless submarine warfare which was being waged in the Mediterranean. On Jan. 18, 1916, Secretary Lansing proposed that the practice of arming vessels be abolished. His object was to have such vessels considered as auxiliary craft, to keep Americans off them, and to have a clearer case against Germany if submarines sank unarmed vessels and caused loss of lives. This proposal was unanimously rejected by the Entente Allies, who insisted that arming ships was justified by international law. Figures announced later by the British Admiralty showed that more than 75 per cent of all armed vessels escaped destruction by submarines, while of the unarmed only 24 per cent escaped when attacked. Germany took advantage of the proposals made by Lansing and announced that after March 1 all armed merchantmen would be sunk without warning. The diplomatic position of the United States had been weakened, and discussion of the matter began in Congress, where a resolution was introduced warning Americans to keep off armed merchant ships of belligerent nationality. The Administration interfered, and the resolution was tabled. But another element had been introduced into the submarine controversy.

Sinkings continued throughout 1916. An outstanding outrage was the case of the Channel steamer *Sussex*, an unarmed passenger boat, which was sunk without warning on March 24. After six weeks of talk, Germany declared that the submarine commander had made a mistake; his judgment of the character of the vessel had been too hurried, and it followed therefore that "the assurance given to the American government in accordance with which passenger vessels were not to be attacked without warning has not been adhered to in the present case" Sinkings in the next few months did not specifically involve American rights. On November 6, the *Arabia* was torpedoed in the Mediterranean without warning; all the 450 passengers were saved. Six Americans had been killed on October 30. The two cases were coupled in Wilson's protests to Germany. The British admiralty announced that from May 5, the date of Germany's *Sussex* pledge, to October 28, 22 British merchant ships had been torpedoed without warning, and 131 noncombatants had lost their lives.

In spite of these cases, there was a feeling that Germany was standing by her pledges, barring unfortunate accidents or enthusiastic commanders' exceeding their instructions. There was a public discussion of the possibility of peace (December, 1916), but on Jan. 31, 1917, came the thunderbolt of Germany's decree of unrestricted submarine warfare. The "illegal measures" of Germany's enemies were to be met by "forcibly preventing after Feb. 1, 1917, in a zone around Great Britain, France, Italy, and in the eastern Mediterranean all navigation.

that of neutrals included, from and to England, and from and to France, etc. All ships met within that zone will be sunk."

"Overt Acts."—President Wilson announced his policy on February 3 in an address to the two houses of Congress in joint session. He quoted the solemn warning of his *Sussex* note, that unless Germany immediately abandoned her use of submarines contrary to international law and "the universally recognized dictates of humanity," the United States would sever diplomatic relations, and the German pledge in reply, that vessels would not be sunk in the war zone "without warning and without saving human lives, unless these ships attempt to escape or offer resistance." Ambassador Bernstorff had therefore been given his passports; Ambassador Gerard had been recalled. Only "actual overt acts" would make Wilson believe that the German government would go through with its plan, but if "American ships and American lives should in fact be sacrificed by their naval commanders in heedless contravention of the just and reasonable understandings of international law and the obvious dictates of humanity, I shall take the liberty of coming again before the Congress to ask that authority be given me to use any means that may be necessary for the protection of our seamen and our people in the prosecution of their peaceful and legitimate errands on the high seas."

Armed Neutrality.—President Wilson did not have to wait long for "overt acts" Two American vessels were sunk, and an attack on the French steamer *Athos* caused the death of an American missionary. More serious was the virtual embargo on the mails and shipments of various sorts to Europe With no protective measures decided on by the Wilson administration, American vessels were fearful of braving the submarine menace. At the end of three weeks it seemed clear that the threat of Wilson's address to Congress in breaking off diplomatic relations would have no effect, and so on February 26 he again addressed Congress, this time to ask for the authority which he deemed necessary to safeguard the rights of the United States. He desired "armed neutrality, which we shall know how to maintain and for which there is abundant American precedent." He was not "contemplating war or any steps that need lead to it." He asked for authority "to supply our merchant ships with defensive arms" A measure was immediately prepared by the Foreign Relations Committee and introduced in the Senate to carry out President Wilson's policy of armed neutrality. The resolution passed the House on March 1 by an overwhelming vote, but the rules of the Senate which failed to limit debate permitted a "group of willful men," in the Wilson phrase, to filibuster and prevent action before the time set for the Congress to come to an end On March 9 Wilson issued a proclamation calling Congress in special session for April 16; the reason assigned was the necessity for a great variety of emergency legislation, but preparations for armed neutrality went on without legislative authorization. An old statute was relied on, and on March 12 it was announced that the United States had determined "to place upon all American merchant vessels sailing through the barred areas an armed guard." Meanwhile Germany continued to commit "overt acts." The *Laconia* was sunk on February 25, and two American lives were lost. On March 12 the American steamship *Algonquin* was sunk, and 14 American members of the crew had to spend 26 hours in open boats. On March 19 the sinking of three American ships was announced. There were others also. These sinkings showed that armed neutrality was inadequate. On March 21 the President summoned Congress for special session on April 2, "to receive a communication by the Executive on grave questions of national policy which should be immediately taken under consideration"; steps were at once taken to mobilize the country for the prosecution of a war. It was practically a foregone conclusion that President Wilson intended to ask Congress to declare the existence of a state of war. The pretense of armed neutrality was anomalous and inadequate.

Entry into the War.—Four days after the President's address, both Houses of Congress passed the joint resolution formally recognizing the state of war which had been forced on the United States. It was the fifth formal declaration of a war with a foreign power. "We have no selfish ends to serve," said Mr. Wilson in his address. "We desire no conquest, no dominion. We seek no indemnities for ourselves, no material compensation for the sacrifices we shall freely make." The United States, at least, was not brought into the conflict by secret treaties.

Other Neutral States. In his message to Congress on February 3, President Wilson took it for granted "that all other neutral governments will take the same course" of breaking off diplomatic relations This was not the case with European states, but the Latin American countries did follow the lead of the United States. Cuba and Panama joined the United States on April 7 and 8. Brazil broke off diplomatic relations on April 11 and declared war on October 26. Intercourse with Germany was also severed by Bolivia (April 13), Guatemala (April 27), Honduras (May 17), Nicaragua (May 19), Haiti (June 15), Costa Rica (September 23), Peru (October 6), Uruguay (October 7), and Ecuador (December 9). The Argentine, Chile, and Venezuela remained more or less neutral. Liberia declared war on August 7 and China on August 14. Siam entered the conflict on July 22. Others which came in in 1918 were: Costa Rica (May 23), Guatemala (April 22), Haiti (July 15), Honduras (July 19), and Nicaragua (May 24).

Greece also came in, but because of Allied pressure rather than on account of the submarine warfare. Venizelos had been dismissed in October, 1915, and from then until May, 1916, Constantine, strongly pro-German in his sympathies, tried to be a monarch who governed as well as reigned. He desired premiers of his way of thinking and called to the office Zaimis and then Skoloudis. In May, with the consent of Constantine, the Greek commanders allowed the Bulgarian troops to occupy Fort Rupel, the key to the Struma Valley. In August, Seres and Kavalla were also surrendered to the Bulgarians and the Greek troops were interned in Germany. Venizelos intervened. He established at Saloniki a provisional government which was recognized by the Allies, and he declared war on Bulgaria. The authority of the King was repudiated by Crete, Samos, and other islands, but the mainland remained under his control. Both Italy and Russia were reluctant

to have the Allies intervene drastically. Italy feared the rivalry of a Greece made strong under Venizelos, and Russia, on dynastic grounds, objected to the deposition of Constantine. In June, 1917, after the Russian revolution, the Entente at last intervened. Constantine was removed and sent to Switzerland. Venizelos returned to Athens, and on June 30 Greece broke off diplomatic relations with Germany and Austria.

The Secret Treaties. In order to get Italy and Rumania into the War and to arrange for a division of the spoils in the event of victory, the Entente entered into a series of secret treaties which were hardly consistent with their publicly professed war aims. Some of these treaties have already been referred to in discussing the negotiations which the Allies carried on in order to oppose to Germany a united diplomatic front. The secret agreements were so important, during the War and particularly at the Peace Conference, that they should be enumerated here. Most of them saw the light after the Bolshevik revolution. In publishing the documents which were found in the Russian Foreign Office, Trotsky said that "secret diplomacy is a necessary weapon in the hands of a propertied minority, which is compelled to deceive the majority in order to make the latter obey its interests." He declared that "the Russian people, as well as the peoples of Europe and of the whole world, must know the documentary truth about those plots which were hatched in secret by financiers and industrialists, together with their parliamentary and diplomatic agents."

The more important agreements were the following:

(1) Anglo-French agreement on Togoland, Sept. 13, 1914, and Kamerun, 1916.

(2) The Anglo French Russian agreement of Mar. 20, 1915, regarding Constantinople, the Straits, Persia, and oil. Britain consented to the annexation by Russia of the Straits and Constantinople in return for a similarly benevolent attitude on Russia's part toward the political aspirations of Britain in other parts

(3) The pledge to Italy (the Treaty of London, Apr 26, 1915) regarding the territories she should receive: the Trentino, the Southern Tirol, Trieste, Gorizia and Gradisca, Istria, Dalmatia, islands off the Dalmatian coast, northern Dalmatia, 12 islands off the coast of Asia Minor, a share in the partition of Asiatic Turkey, an addition to her colonial territory in Africa, and a share in the war indemnity. The treaty contemplated cutting Austria-Hungary off from the sea.

(4) The Russo-French agreement of Apr. 26, 1916, regarding the partition of Asiatic Turkey; Britain to obtain southern Mesopotamia, with Bagdad and two ports in Syria, France to obtain Syria, the Adana vilayet, and western Kurdistan, Russia to obtain Trebizond, Ezerum, Bitlis, Van, and territory in southern Kurdistan

(5) The Sykes-Picot (Anglo-French) agreement of May 9, 1916, regarding the partition of Asiatic Turkey.

(6) The Rumanian treaty (Aug 18, 1916) regarding the partition of Austria-Hungary. Rumania was to receive Transylvania up to the river Theiss, the Bukovina up to the river Pruth, and the Banat.

(7) The Franco-Russian agreement of February-March, 1917, regarding Alsace-Lorraine, the Saar Basin, the left bank of the Rhine, and Russia's western frontier. France recognized "Russia's complete liberty in establishing her western frontiers."

(8) The pledges to Japan, February–March, 1917, regarding German possessions in the Far East. This treaty was imperfectly known before the Peace Conference.

(9) The St Jean de Maurienne Agreement, April, 1917, regarding Italy's prospective share in Asiatic Turkey. Italy was given complete possession of nearly the entire southern half of Anatolia, including the cities of Adalia, Konia, and Smyrna, together with a "zone of influence" northeast of Smyrna.

It is difficult if not impossible to reconcile these secret treaties with the public war aims of the Entente Allies. Certainly the agreements were inconsistent with the promise that the Turkish portions of the Ottoman Empire should have "a secure sovereignty," and with the more general pledge of "free, open-minded, and absolutely impartial adjustment of all colonial claims, based on a strict observance" of the principle that "the interests of the populations concerned must have equal weight with the equitable claims of the government whose title is to be determined." The Russian archives were opened just about the time that Wilson was announcing his famous Fourteen Points. Not the least curious feature of the preparedness which was being attempted for the Peace Conference was Wilson's apparent ignorance of both the fact and the contents of these secret agreements. They were published in England in the *Manchester Guardian* and in the United States in the *New York Evening Post*, which said that if there was "one man who has profited by the publication of the secret documents given out by the Russians" it was Woodrow Wilson. Ray Stannard Baker's volumes on Wilson at the Peace Conference make it clear that he was inadequately informed, and, indeed, Wilson confessed as much in his conference with the Senate Committee on Foreign Relations when the Treaty of Versailles was under discussion Had he known in advance of the Conference of the existence of the secret agreements, it is possible that there would have been some cancelation of them. Allied dependence in the summer of 1918 on the United States for money and men was so great that selfish territorial aspirations would have been sacrificed. The safety of the state would have been a more pressing consideration than territorial aggrandizement in the event of a victory at that moment quite uncertain.

Peace Feelers. The historian of the future will have to deal minutely with the question whether the War in Europe could have been brought to an end sooner than Nov. 11, 1918. He will have to consider whether the statesmen, for refusing to agree to an earlier settlement, must not suffer greater condemnation than the generals who at particular moments were found wanting. The verdict to be rendered will be influenced by the hypnotic effect which a sweeping victory has on those who witness it and which it will always have on the historians who discuss it. Consequently, it is natural to expect that German historians will be chiefly interested in the problem. Indeed, one of the first acts of the Reichstag was to appoint a commission to determine whether peace was missed at the time of President Wilson's proposals in the autumn of 1916. The speeches of statesmen for the period 1916–18 and the published correspondence cover 250 closely printed pages (G. Lowes Dickinson, *Documents and Statements Relating to Peace Proposals and War Aims [December, 1916–November, 1918]*, New York, 1919), and this collection does not include revelations which have since been made in various quarters. These secret discussions were by all odds the most important. The historian will surely say that the public pronouncements, apart from Wilson's speeches and a half dozen flashes from other Allied voices, were hasty, insincere, artificial, and forced. Rarely did they rise to the dignity and elevation which would have been worthy of the great issues involved, and which, indeed, were due the millions risking their lives.

Wilson's Attempts.—On Aug. 5, 1914, President Wilson made his first attempt at mediation. He sent an identical message to Emperor William of Germany, Emperor Francis Joseph of Austria-Hungary, Emperor Nicholas of Russia, King George of Great Britain, and President Poincaré of France. He said: "As official head of one of the powers signatory to The Hague Convention, I feel it to be my privilege and my duty, under Article III of that Convention, to say to you in a spirit of most earnest friendship that I should welcome an opportunity to act in the interest of European peace, either now or at any other time that might be thought more suitable, as an occasion to serve you and all concerned in a way that would afford me lasting cause for gratitude and happiness." The belligerents made only formal acknowledgment of this offer. After the German retreat from the Marne, President Wilson, on unofficial suggestions by Count Bernstorff, had Ambassador Gerard sound out the German Chancellor, who replied that since the War had been "forced" on Germany, the President should first appeal to the Entente. Colonel House went abroad for the President during the winter 1914–15 and on his return reported that the moment for peace had not yet come. On June 2, 1915, in discussing the *Lusitania*, President Wilson told Bernstorff that if Germany would give up the use of submarines, he could persuade the English cabinet to agree to abandon the attempt to starve Germany, and he "hoped that this would be the beginning of peace action on a great scale." In January, 1916, Colonel House again went to Europe. He found the chief opposition to peace in Paris and a certain willingness in Berlin and London. Many discussions were held between Bernstorff and Colonel House, in New York City, in order to avoid the publicity which White House conferences would have entailed. "House told me," Bernstorff later reported, "that Wilson no longer had the power to oblige England to obey the practices of international law [this was just after the *Sussex* affair]; American trade was so intimately tied up with the Entente that Wilson could not possibly disturb these trade relations without evoking a terrific storm. On the other hand, he was in a position to obtain a peace without victory, and he intended to do so as soon as an opportunity offered itself. But seeing that such a step would now be universally called pro-German in America, he could only do it when public opinion about relations with Germany had somewhat calmed down. He proposed a pause and hoped without fail to be able to make a beginning of peace mediation toward the end of the summer." Rumania entered the War; the Entente became more certain of victory; and intervention was deferred.

Meanwhile, Bethmann-Hollweg had been thinking of the possibility of peace discussions. Paléologue's memoirs record evidences of approaches, some probably unauthorized, from Berlin, Darmstadt, and Vienna. Russia also had taken soundings. In October, 1916, the Emperor transmitted through Ambassador Gerard a memorandum to the effect that he was willing to entertain a peace offer, but the approaching presidential election caused a delay. Bernstorff endeavored to delay the German overture until Wilson could act, but on Dec. 12, 1916, a few days after the fall of Bucharest, Bethmann-Hollweg issued a note which said that the resistance of the Central Powers could not be broken but that animated "by the desire to stem the flow of blood and to bring the horrors of war to an end, the four allied Powers propose to enter even now into peace negotiations." On December 18 President Wilson issued his famous appeal for peace. He was "somewhat embarrassed to offer it at this particular time, because it may now seem to have been prompted by the recent overtures of the Central Powers. It is in fact in no way associated with them in its origin." To the popular mind this was difficult to believe, but it was true. As Bernstorff later told the Reichstag investigating committee, "the peace note which Wilson despatched on December 18 had been composed as far back as the middle of November but had been thrust by Wilson into his writing-table, because another wave of anti-German feeling swept through the country on account of the Belgian deportations. Colonel House told me that the peace offer which was already drawn up by the middle of November was not sent off by Wilson because he could not be responsible for it in the state of public feeling." On November 24 Bernstorff had telegraphed: "Wilson has commissioned Colonel House to tell me in the strictest confidence that he would undertake an effort for peace as soon as possible, presumably between now and the New Year. But meanwhile he made it a condition that we should discuss peace as little as possible, and that we should allow no new submarine controversies to spring up, in order to prevent a premature refusal by our enemies."

Allied Sentiment.—All the Allies vigorously denounced the German offer as an attempt to divide them. The general feeling was well expressed by the British note: "To enter, on the invitation of Germany proclaiming herself victorious, without any knowledge of the proposals she has to make, into a conference, is to put our heads into a noose." On December 25, while waiting for the Allied reply to her proposal, Germany made an answer to President Wilson's appeal for a definition of war aims and peace terms. The note said nothing at all about terms; it proposed instead "an immediate meeting of delegates of the belligerent states at some neutral place." When the German reply was received, Bernstorff "telegraphed that Lansing had begged him at any rate to communicate our peace terms to him in confidence." The Allies, however, seized the opportunity which President Wilson's appeal offered them. They had not as yet drawn up any coherent programme. They had divided up the spoils in the secret treaties, but their public pronouncements had been general and not particular. The Allied reply pledged wholehearted support of "a League of Nations to ensure peace and justice throughout the world" and then went on to enumerate the essential elements of a satisfactory settlement: the restoration of Belgium, Serbia, and Montenegro, with compensation; the evacuation of French, Russian, and Rumanian territories, with reparation; the liberation of Italians, Slavs, Rumanians, and Czecho-Slovaks from foreign control; the expulsion of Turkey from Europe, and the restitution of provinces previously torn from the Allies by force and against the wishes of their inhabitants.

German Conditions.—On Jan. 11, 1917, Germany and Austria sent notes to the neutral

states declaring that the Entente must bear the responsibility for continuing the bloodshed. Meanwhile preparations were proceeding in Germany for unrestricted submarine warfare; Wilson made his famous "peace without victory" speech to the American Senate (Jan. 22, 1917) and pressed Germany for a statement of her conditions. According to Bernstorff, President Wilson was quite hopeful of the successful outcome of the negotiations. The German Ambassador reported to his government on Jan. 27, 1917, that "Wilson was convinced that he would be able to bring about both peace conferences" and that the Entente note was a bluff. The Chancellor, in a frantic effort to win the race from the military leaders who were insisting on submarines rather than peace talk, did telegraph some terms on January 29. He refused to allow them to be published, "for they would look like weakness." But the documents printed in the report of the Reichstag committee show that the military leaders were not modest in the demands which they proposed to make of the Allies, and it was they, rather than Bethmann-Hollweg, who really governed Germany The Chancellor, before he could even talk to Baron Burian about Austria's terms, had to obtain the consent of the General Field Marshal and the Emperor. The terms discussed included the annexation of Courland and Lithuania; the retention of Briey and Longwy; the return of the colonies with the exception of Kaiochow, the Carolines, and the Marianna Islands, and in compensation therefor the acquisition of the Congo State or a part of it; the indemnification of Germans living abroad, and the incorporation of Luxemburg into the German Empire. In January the Emperor became even more severe and said that the German war aims must be recast. He was then unwilling to allow King Albert to return to Belgium and declared that the coast of Flanders must belong to Germany. But it was too late. Germany would have to fight for these results on the battlefield rather than in the conference room The U-boat campaign could not be postponed; 21 boats had left for their stations and could not be communicated with. The submarine was to bring the United States into the War, and "force without limit" instead of "peace without victory" was thereafter to be Wilson's hope.

The Year 1917.—Meanwhile peace discussions were beginning in another quarter, and they continued through 1917. The time was not unfavorable, and the public manœuvres furnished a not inappropriate screen for the backstairs pourparlers. In July the Reichstag passed its famous "majority resolution" calling for "a peace of understanding and the permanent reconciliation of the peoples." Bethmann-Hollweg had resigned in favor of Michaelis, who in turn was to be replaced in October by Hertling and a semiparliamentary combination which accepted the Reichstag's programme. August found the Pope publicly appealing for peace; Count Czernin made speeches emphasizing disarmament; Russia was demanding a discussion of war aims; the Socialists in the belligerent countries were attempting meetings, and even a Conservative like Lord Lansdowne cried out to stop the slaughter and save European civilization. During the summer of 1917 the morale of France was at its lowest point, and Caporetto, Byng's failure at Cambrai, and the Bolshevik revolution were hardly encouraging to the Allies. President Wilson seemed to be willing that, while no compromise could be made with Prussia, the Allied cause should be strengthened by a diplomatic offensive which might affect the peoples of the Central Powers; and since Austria-Hungary was obviously war-weary, he and Lloyd George thought of the possibility of a separate peace. Any agreement with Germany at this time would have meant Prussian hegemony in the East; the Allies needed no proofs of this, even before Brest-Litovsk. Hence there was an effective veto on an "unclean" peace, and a military offensive on the western front, however horrible and uncertain, was not too high a stake to risk for the defeat of Germany's eastern ambitions.

The Austrian Attempts—This, in brief, was the situation when Austria sued for peace. Emperor Karl, on coming to the throne in November, 1916, had expressed his desire to end the conflict and had called attention to the fact that he had had no share in its beginning. The emissary now employed was Prince Sixtus of Bourbon, the brother of Empress Zita In January the Prince learned from his mother in Switzerland that the Emperor was ready for a secret armistice with Russia and that he was also willing for the restoration of Alsace-Lorraine and the creation of a Jugo-Slav kingdom. In March the Prince, going to negotiate with Poincaré, took with him an autographed letter from the Emperor. The dossier of the Prince has now been published, and it is a document of great interest, both in the facts which it discloses and in the revelations which it makes concerning the mental attitudes of the statesmen who during the War had peace or a continuance of the conflict within their discretion. They consulted no one. It appears from the dossier that Lloyd George, with whom the Prince had several interviews, was sincerely anxious to deflect Austria but was hampered by obligations toward France, Italy, and Russia. President Poincaré, on the other hand, was almost willing to abandon Italy. "France's interest," he declared, "is not only to maintain Austria, but to aggrandize her at the expense of Germany." In a later interview he was almost willing to desert Poland and Rumania; too much had been promised the smaller allies. Ribot appears always to have been a bitter-ender, but if there had been complete willingness on the part of England and France, Italy would have proved a stumblingblock. Sonnino, in Lloyd George's phrase, was "obstinate, difficult, and troublesome." Austria did not propose sufficient territorial concessions to satisfy Italy. Austria's position, indeed, was hopeless. Defeat would mean her dissolution, and victory would mean complete German dominance. Russia and the United States were only imperfectly informed of these transactions. It seems possible that if the decision had rested with Poincaré and Lloyd George, Germany in the spring of 1917 might have found herself separated from her Allies. Austria and France, from time to time, continued their discussions, through meetings between Count Revertera and Count Armand in Switzerland.

The Pope's Efforts.—Other unpublished conversations are alluded to in the Prince Sixtus document. Mention is made of one between Bulgaria and England, one between Austria and Italy, and several between Austria and Russia. On Aug. 14, 1917, the Pope issued a peace note,

to which President Wilson replied that the rulers of Germany could not be trusted. At the same time the Vatican was making private efforts; it did secure Germany's consent to the restoration of Belgium, but the German government took the position that conversations were possible only if the conflict ended in a draw.

Germany.—Meanwhile, also, Germany herself was "feeling out" France. Proposals were made in June and August by Baron Lancken, the political director of the German government in Brussels, that Briand, who was in Ribot's cabinet, should go to Switzerland to meet Lancken or even the German Chancellor himself. The territorial suggestions were not dissimilar to those in the Sixtus negotiation. Austrian territory, Trieste and Trentino, was to be ceded to Italy, just as in the Sixtus attempt Austria was free with Alsace-Lorraine. Germany, according to Briand's later explanation in the Chamber, was willing to discuss the restoration and even compensation of Belgium and was willing to compromise on Alsace-Lorraine. Briand asked permission to meet Lancken, and in this he was supported by Belgium and Rumania; but Ribot refused. Briand then asked that the Allies be consulted, and to this Ribot consented, but Briand later expressed his opinion that the proposals were presented in such a way that their rejection was probable. President Wilson and Kerensky were informed only after the incident had been concluded. In the following month there was a new French Cabinet; Painlevé became Prime Minister, with Ribot as Minister for Foreign Affairs There was a secret session of the Chamber of Deputies at which Briand revealed the proposals made by Germany and assailed Ribot for his rejection of them without further investigation. Ribot was forced to resign. Villalobar, the Spanish Minister at Brussels, inquired in London as to the British attitude toward the integrity of Germany, indemnities, and economic boycotts. A conference of Allied ministers agreed that this was another attempt to separate them. In January, 1918, the Allies' aims were more explicitly defined in Wilson's Fourteen Points as well as speeches by Lloyd George. Discussions behind the scenes still proceeded. General Smuts and Count Mensdorff met secretly in Switzerland; Armand and Revertera met again; the Bavarian Törring-Jettenback and the Belgian Minister at Bern saw each other, and the King of Denmark asked Germany for her terms.

Final Austrian Attempt.—One other overture demands special mention, since, in the opinion of R. W. Seton-Watson, a leading authority on eastern European politics, it alone had any serious prospect of success. In February, 1918, the late Professor Lammasch, known to Americans for his service on The Hague Court and his connection with the Carnegie Endowment for International Peace, made a direct appeal to Washington in the name of Emperor Karl. President Wilson was asked to make a pronouncement that the United States regarded Germany and Austria-Hungary in different lights, and that Austria-Hungary would receive favorable terms if she granted her subject nationalities autonomy. The speech was made to Congress on Feb. 11, 1918. "Count Czernin," said President Wilson, "seems to see the fundamental elements of peace with clear eyes and does not seek to obscure them." Lammasch then introduced an autonomy bill in the Austrian Herrenhaus, but he was bitterly attacked. Germany got wind of the scheme and the Austrian deflection was checked.

Most of the disclosures made up to 1924 as to these peace feelers appeared in private memoirs. One motive for publication has been to accuse various personalities of their responsibilty for continuing the struggle, and both the source and the tendencious character of the documents invalidate them as trustworthy evidence for the judgment of Allied statesmen. It would seem as if the time had come for the complete disclosure of every manœuvre and gesture for peace. If full disclosures are much longer withheld, the suspicion may develop that the Allied governments have something to conceal. If, on the other hand, the bar to peace was always the attitude of the German government, then publication would be to the advantage of the Allies. In either case, it is a striking fact that so few men had the decision of peace in their hands, subject to no check except a vague and on occasion controllable public opinion. The diplomats of the Allied democracies were no less secret and autocratic than those of the Central Powers.

War Aims. Late in 1917 and early in 1918 the increasing war-weariness, the knowledge of the imperialistic character of the Allied Secret Treaties, and the failure of the peace moves to hasten the end of the War, quickened the impatience of the Allied peoples. This attitude manifested itself in the statement of war aims incorporated in the British Labor Memorandum of December, 1917. Founded on Wilson's precept that "the world must be made safe for democracy," and taking a stand categorically against a war for conquest, the Labor statement called for the establishment of a League of Nations, restoration of Belgium, self-determination for Alsace-Lorraine and the Italian peoples in the Dual Monarchy, civil and political liberties for the Jews, the reorganization of the Balkans, and recognition of the national claims of the Czecho-Slovaks and the Jugo-Slavs. This was followed by the speech of Lloyd George on Jan. 5, 1918, which accepted the Labor position in substance. The following specific items are interesting to note. The Allies were not fighting against the German people and were not seeking to destroy or disrupt the German people or Germany; they were not fighting to destroy Austria-Hungary or to seize Constantinople and Thrace, "which are predominantly Turkish in race." But it was President Wilson's famous speech of January 8, before Congress, that overshadowed all other such statements. This contained the Fourteen Points that served as the basis for the German Armistice. These points were:

I. Open covenants of peace, openly arrived at; after which there shall be no private international understandings of any kind, but diplomacy shall proceed always frankly and in the public view.

II. Absolute freedom of navigation upon the seas, outside territorial waters, alike in peace and in war, except as the seas may be closed in whole or in part by international action for the enforcement of international covenants.

III. The removal, so far as possible, of all economic barriers and the establishment of an equality of trade conditions among all the nations consenting to the peace and associating themselves for its maintenance.

IV Adequate guarantees given and taken that national armaments will be reduced to the lowest point consistent with domestic safety.

V. A free, open-minded, and absolutely impartial adjustment of all colonial claims, based upon a strict observance of the principle that in determining all such questions of sovereignty the interests of the populations concerned must have equal weight with the equitable claims of the government whose title is to be determined.

VI. The evacuation of all Russian territory, and such a settlement of all questions affecting Russia as will secure the best and freest cooperation of the other nations of the world in obtaining for her an unhampered and unembarrassed opportunity for the independent determination of her own political development and national policy, and assure her of a sincere welcome into the society of free nations under institutions of her own choosing; and, more than a welcome, assistance also of every kind that she may need and may herself desire. The treatment accorded Russia by her sister nations in the months to come will be the acid test of their good will, of their comprehension of her needs as distinguished from their own interests, and of their intelligent and unselfish sympathy.

VII. Belgium, the whole world will agree, must be evacuated and restored without any attempt to limit the sovereignty which she enjoys in common with all other free nations. No other single act will serve as this will serve to restore confidence among the nations in the laws which they have themselves set and determined for the government of their relations with one another. Without this healing act the whole structure and validity of international law is forever impaired.

VIII. All French territory should be freed and the invaded portions restored; and the wrong done to France by Prussia in 1871 in the matter of Alsace-Lorraine, which has unsettled the peace of the world for nearly 50 years, should be righted, in order that peace may once more be made secure in the interest of all.

IX. A readjustment of the frontiers of Italy should be effected along clearly recognizable lines of nationality

X. The peoples of Austria-Hungary, whose place among the nations we wish to see safeguarded and assured, should be accorded the freest opportunity of autonomous development

XI. Rumania, Serbia, and Montenegro should be evacuated, occupied territories restored, Serbia accorded free and secure access to the sea, and the relations of the several Balkan states to one another determined by friendly counsel along historically established lines of allegiance and nationality; and international guarantees of the political and economic independence and territorial integrity of the several Balkan states should be entered into.

XII. The Turkish portions of the present Ottoman Empire should be assured a secure sovereignty, but the other nationalities which are now under Turkish rule should be assured an undoubted security of life and an absolutely unmolested opportunity of autonomous development, and the Dardanelles should be permanently opened as a free passage to the ships and commerce of all nations under international guarantees

XIII. An independent Polish state should be erected which should include the territories inhabited by indisputably Polish populations which should be assured a free and secure access to the sea, and whose political and economic independence and territorial integrity should be guaranteed by international covenant.

XIV. A general association of nations must be formed, under specific covenants, for the purpose of affording mutual guarantees of political independence and territorial integrity to great and small states alike

On Jan. 25, 1918, Count von Hertling for Germany and Count Czernin for Austria-Hungary disavowed any imperialistic designs; but the conduct of the German Military Headquarters at the Brest-Litovsk negotiations once more indicated that the fair promises of German statesmen were to be lightly regarded. On February 11, President Wilson set forth, in a reply to the above speeches, "Four Principles" on the acceptance of which a discussion of the terms of peace would be possible. These were, in brief: (1) each part of the final settlement to be based on the essential justice of that particular case; (2) people and provinces not to be bartered from one sovereignty to another as if they were chattels; (3) every territorial settlement to be made in the interest of the populations concerned; (4) national aspirations to be satisfied to the utmost without introduction or perpetuation of elements of discord. On July 4, another speech added to the theoretical character of the Wilson conception of a just peace. Here, President Wilson laid down "Four Ends" which "can be put into a single sentence. What we seek is the reign of law, based upon the consent of the governed and sustained by the organized opinion of mankind." Finally, on September 27, there came these "Five Particulars" to round out finally the Wilsonian principles:

I. The impartial justice meted out must involve no discrimination between those to whom we wished to be just and those to whom we did not wish to be just.

II. No special or separate interest of any single nation or any group of nations can be made the basis of any part of the settlement which is not consistent with the common interest of all.

III. There can be no leagues or alliances or special covenants and understandings within the general and common family of the League of Nations

IV And, more specifically, there can be no special selfish economic combinations within the League, and no employment of any form of economic boycott or exclusion, except as the power of economic penalty, by exclusion from the markets of the world, may be vested in the League of Nations itself as a means of discipline and control.

V All international agreements and treaties of every kind must be made known in their entirety to the rest of the world.

On October 4 a German peace note, despatched to President Wilson, accepted the Fourteen Points as the basis of a peace; on October 7, an Austro-Hungarian note agreed to the principles adumbrated in the Fourteen Points, the Four Principles, and the Five Particulars The rest of the world, too, looked on these lofty utterances as the only possible elements of the creation of a just and enduring settlement.

Russia. The intervention of the United States and the Russian revolution marked the turning-point of the War In a way the two events were complementary, but on the other hand they also served to neutralize each other Russian participation in the fight against "autocracy" had always been an anomaly; the régime of the Czar was the most autocratic in Europe. The Russian revolution, with the ensuing war-weariness and a separate peace, would have robbed the Entente of victory but for aid from America. The revolution occurred three weeks before the United States declared war The new government announced that its object was "to establish a durable peace on the basis of the rights of nations to decide their own destinies." There was a turn to the Left in the latter part of May, and Kerensky, who came to power, appealed to the Allies for a restatement of their war aims. Little moral assistance was given him, but it was indispensable if Kerensky was to make concessions to the growing power of the Soviets and at the same time remain loyal to the Entente. The Allied leaders, moreover, were hostile to the idea of a labor conference at Stockholm to discuss the possibilities of peace; Lloyd George was willing, but his colleagues disagreed. Kerensky was able to spur his southern armies to one offensive, but its strength was shortlived. In November Kerensky was overthrown by the Bolsheviks. Lenine became president of the Council of People's Commissars, and his first aim was to make peace An armistice with Germany was signed on December 3, and negotiations began at Brest-Litovsk on December 22. Germany insisted on retaining her conquests of Russian territory, she claimed that Lithuania, Courland, Poland and Esthonia desired separation from Russia.

Trotsky, who was Russian foreign minister, denounced this action and maintained that "self-determination" should be allowed the populations affected. On March 3 the peace was signed, and it was ratified a fortnight later by the Congress of Soviets. By the agreement Germany promised not to send troops from the Eastern to the Western Front, but she ignored this pledge. An offensive on the West was her chief purpose in securing the peace. The defection of Russia thus made possible the operations which began in March, 1918. It also contributed to a redefinition of the war aims of the Entente, an action which should have been taken while Kerensky was in power. Peace with Rumania was signed on May 7.

Bulgaria and Turkey. There was little discussion of politics or diplomacy during the summer of 1917. The issue of the War was being determined by Ludendorff's great offensive. (See WAR IN EUROPE, *Eastern Front*) German defeat was foreshadowed by Foch's counteroffensive which began on July 18. Two months later peace began to be discussed. On September 15 Austria issued an appeal for the verbal discussion of peace. President Wilson replied that his terms had already been stated in the Fourteen Points and that a conference was impossible. Ten days later Bulgaria collapsed. Before the month was out the Turkish army in northern Mesopotamia surrendered; an armistice was signed, and the Straits were opened to the Allies.

The Armistices. Austria-Hungary, meanwhile, was having internal troubles. At different times during the summer of 1918, France, Great Britain, and the United States recognized the belligerency or independence of the Czecho-Slovaks, and thereafter the Slav deputies in the Austrian Reichsrat openly defied the government. In the event of Allied victory, the Jugo-Slavian, Italian, and Rumanian parts of Austria-Hungary were, by treaties and engagements, already negotiated to Serbia, Italy, and Rumania respectively. The Bulgarian surrender was the beginning of the end. At the opening of the Austrian Reichsrat three days later, Prime Minister Hussarek delivered a pathetically ludicrous address about "setting" the Austrian "house in order" and "considering and solving the problem of autonomy for the different nationalities." Mere autonomy within the Dual Monarchy was now hopelessly anachronous. The Monarchy was doomed, as were its coequal parts, the Empire and the Kingdom. On October 4, Germany, Austria-Hungary, and Turkey offered to negotiate peace on the basis of President Wilson's Fourteen Points and subsequent addresses. On October 8 Wilson asked the German Chancellor whether he was "speaking merely for the constituted authorities of the Empire." By wholly ignoring the Austro-Hungarian government he clearly indicated that he regarded that government as incompetent to speak for its peoples. Thereupon a panicky attempt was made to create a coalition cabinet which would be somewhat representative of the various nationalities. The Czechs and other nationalities refused to be led into such a trap. There were also evidences that Hungary was ready to scuttle the sinking Austrian ship in the hope of appearing herself in the guise of a submerged and oppressed nationality.

President Wilson's note of October 18 in effect demanded as a condition for the negotiation of peace the independence of the Czecho-Slovaks and Jugo-Slavs. On the same day, the Czecho-Slovak National Council, sitting in Paris, declared the independence of Czecho-Slovakia and constituted itself the provisional government of the country. The German members of the Austrian *Abgeordnetenhaus*, realizing that the end was at hand and ignoring both the Dual Monarchy and the Austrian Empire, constituted themselves a provisional national assembly to represent the German-Austrian people at the peace table. Meanwhile there had been a change of government in Germany. Prince Max of Baden had been appointed Chancellor and his cabinet included representatives of labor. On October 8 Wilson asked three questions: Did Germany accept the terms of the Fourteen Points and subsequent addresses? Would troops be withdrawn from invaded territory? Did the Chancellor speak merely for the Imperial authorities who had so far conducted the War? Further interchanges were necessary before Germany answered these questions to Wilson's satisfaction, and on October 23 he transmitted the correspondence to the Allies. Ludendorff resigned on October 27, and the German retreat became almost a rout. On November 4 the Allies announced that they were willing to make peace on the basis of the Fourteen Points and the principles enunciated in subsequent addresses of Wilson. They reserved complete freedom of action in respect of the interpretation to be given the phrase "freedom of the seas," and they understood by the "restoration" of the invaded territories "compensation for all damage done to the civilian population of the Allies and their property by the aggression of Germany by land, by sea, and from the air." A republic was proclaimed in Germany; the Kaiser abdicated on November 9, and two days later the Armistice was accepted. Wilson's speeches were to form the basis of the peace terms to be agreed on at the Paris Conference, but there, they were to give way frequently to the secret treaties. See PEACE CONFERENCE AND TREATIES; WAR IN EUROPE

WAR CASUALTIES. The loss of human life was greater in the War of 1914–18 than in any previous conflict recorded by history. Almost twice as many men were killed as in all the wars from 1790 to 1913 inclusive. Among the major belligerents, Germany and Russia suffered the greatest loss in men killed and wounded, but in proportion to population, France paid an even heavier toll than Germany. That the Allies collectively suffered so much more heavily than the Central Powers was due to the fact that at least during the early stages of the War, the Central Powers were much better equipped with machine guns and artillery, whereas Russia, the heaviest Allied loser, sent her men into battle ill-equipped, often without artillery support and sometimes without ammunition. The table on page 1386 gives the best available figures for military casualties. In a few cases, notably for Turkey and Russia, only approximate estimates can be given. The figures given in the column headed "Wounded" do not indicate the number of different individuals wounded, since many individuals were wounded several times and hence were repeatedly listed as casualties. A fairly high percentage, however, of wound casualties resulted in permanent and serious injury. In the case of France, for example, the *mutilés* or war-cripples numbered

740,000. If France be taken as typical, it is obvious that the number of men killed, permanently crippled, or permanently injured by gas, must be well over 12,000,000.

Country	Men mobilized	Killed and died [a]	Wounded	Prisoners and missing	Total casualties	Casualties in percentage of total mobilized
Russia	12,000,000	1,700,000	4,950,000	2,500,000	9,150,000	76.3
France	8,410,000	1,357,800	4,266,000	537,000	6,160,800	73.3
British Empire	8,904,467	908,371	2,090,212	191,652	3,190 235	35.8
Italy	5,615,000	650,000	947,000	600,000	2,197,000	39.1
United States [b]	4,355,000	[c] 126,000	[c] 234,000	4,500	350,300	8.0
Japan	800,000	300	907	3	1,210	0 2
Rumania	750,000	335,706	120,000	80,000	535,706	71 4
Serbia	707,343	45,000	133,148	152,958	331,106	46.8
Belgium	267,000	13,716	44,686	34,659	93,061	34 9
Greece	230,000	5,000	21,000	1,000	27,000	11.7
Portugal	100,000	7,222	13,751	12,318	33,291	33 3
Montenegro	50,000	3,000	10,000	7,000	20,000	40.0
Total, Allies	42,188,810	5,152,115	12,831,004	4,121,090	22,089,709	52 3
Germany	11,000,000	1,773,700	4,216,058	1,152,800	7,142,558	64.9
Austria-Hungary	7,800,000	1,200,000	3,620,000	2,200,000	7,020,000	90 0
Turkey	2,850,000	325,000	400,000	250,000	975,000	34 2
Bulgaria	1 200,000	87,500	152,390	27,029	266,919	22.2
Total, Central Powers	22,850,000	3,386,200	8,388,448	3,629,829	15,404,477	67 4
Grand total	65,038,810	8,538,315	21,219,452	7,750,919	37,494,186	57.6

[a] Includes deaths from all causes, in army.
[b] Includes marines serving with army.
[c] Includes 14 500 "died of wounds."

endanger the heterogeneous Austrian dominions. Consequently the work of the Congress of Vienna was an effort to establish the status quo ante bellum. As a result of its endeavors, there were many violations of the principle of nationality Revolutionary periods, following one another during the nineteenth century, endeavored to undo the work of the Congress. Some of these were successful. For example, Belgium was separated from Holland, and Venetia and other Italian-speaking sections were taken away from Austria and joined to the newly-created Italian kingdom. At the close of the nineteenth century, however, several situations remained which clearly violated the principle of national sovereignty. Alsace and Lorraine, although not an inheritance of the French Revolution, clearly represented a violation of the above-mentioned principle. The newly-created German Empire annexed these provinces for reasons partly economic and partly political. French aggression following the battle of Jena, and the rich coal and iron mines in the region, were the fundamental reasons for annexation The French people were constantly aware of the challenge to regain these lost provinces, and Bismarck used the French attitude as justification of his programme of huge military armaments in Germany.

Nowhere else in Europe was the problem of nationality so acute during the nineteenth and early twentieth centuries as in Austria-Hungary. The very existence of the Austro-Hungarian monarchy was a constant challenge to the principle of nationality. Logically carried out, this principle would mean the disappearance of Austria-Hungary and the distribution of its territories among the surrounding nations, or the creation of new ones. The appreciation of this fact made the Austrian authorities apprehensive of all nationalist movements and especially of that of the southern Slavs, in Serbia, Montenegro, Bosnia, etc. As will be seen, it was the outgrowth of one of these movements that led to the outbreak of the War. The Balkan states presented a peculiarly vexing problem in the realization of the principle of nationality. The intricate mixture of racial groups in this region made it an almost hopeless

WAR FINANCING, AMERICAN. See FINANCE AND BANKING, *War Banking and Finance.*

WAR IN EUROPE. On June 28, 1914, the Austrian heir apparent, Archduke Francis Ferdinand (see VOL. IX), and his wife were assassinated at Sarajevo, the capital of Bosnia This set in motion a train of events which culminated in the terrible catastrophe of the War. It is clear, however, that this crime was not the real cause of the tremendous struggle which many of the statesmen and diplomats of Europe had anticipated and which all had feared for many years The underlying causes of this tremendous struggle reach far back into the past and cannot be reduced to any simple formula. Some knowledge of the important political and economic forces shaping the history of Europe during the past century is necessary. Among the many and complex influences suggested as causes of the War, three forces appear to have contributed most directly to the critical situation of Europe in 1914 These were (1) the clashing of national interests and ideals, (2) the maintenance of a system of military alliances, and (3) the economic rivalry among the nations of Europe.

National Antagonisms. Viewed broadly, the political history of Europe in the nineteenth century divides into two movements inherited from the French Revolution and Napoleonic era: (1) the growth of democracy, and (2) the realization of national liberty. When the diplomats of the great powers met at the Congress of Vienna, 1814-1815, to readjust the map of Europe, many expressed the hope that the Congress would be guided in its work by these two principles Unfortunately they were ignored whenever it was necessary to do so in order to satisfy the dynastic and personal influences which dominated the Congress In the first place these principles were anathema to the reactionaries, and in the second place Metternich, the ultraconservative Austrian Chancellor who dominated the Congress, realized that encouragement of the national principle would

task to arrange geographical boundaries to correspond with national lines. The problem was complicated, moreover, by the clashing of the interests of the great European powers, especially Austria and Russia, in this territory. The condition of chronic disorder and strife in this region during the nineteenth century was a source of almost constant concern to the diplomats of the great European states. While the triumph of the ideal of nationality did much to advance European civilization, it was not an unmixed blessing. Too often national patriotism became a fetish. Love of one's country meant a lack of appreciation or a contempt for the people of other countries, a feeling that the *Kultur* of one's country was not only different from but distinctly superior to that of any other country. From this it naturally followed that it was a laudable ambition to wish to impose one's superior civilization on an inferior people From this developed the inevitable antagonism of national interests which dominated European politics during the nineteenth century. In its extreme form this national spirit found expression in movements to unite various related ethnic and racial groups into one political group Such movements were more or less prominent in Germany, Russia, and the Balkan states, under the names of Pan-Germanism, Pan-Slavism, Pan-Serbianism, etc. It is doubtful whether any of these movements had passed beyond the state of vague aspirations held by a comparatively small group of people. As contributing causes of the War, the Pan-Slavic and Pan-Serbian movements were of some importance. The growth of such propaganda was a source of concern to Austria-Hungary, with its large Slavic population. In Germany, although the movement was limited to a comparatively small group, it was very active. Prominent historians, scientists, and philosophers expounded its views, while numerous societies were formed to advance German ideas of culture and civilization throughout the civilized world.

Military Alliances. One of the chief results of the prevalent spirit of intense nationalism was the feeling that it was necessary to defend it with huge armaments. Everywhere the doctrine of military preparedness was advocated, and it bore fruit in the tremendous standing armies and huge navies of the different European countries. It led also to the grouping of the great European powers into two hostile military alliances. The rise of Germany and Italy between 1860 and 1870 seriously disturbed the old European Concert formed at the Congress of Vienna. Bismarck was the guiding spirit in the formation of the first alliance. In order to isolate France he strove to unite Austria, Russia, and Germany. Russia soon withdrew because of inability to get along with Austria. Bismarck then bound Germany and Austria closer together, and in 1882 Italy joined the agreement, thereby forming the Triple Alliance. This was an unnatural alliance for Italy, inasmuch as her interests and Austria's were almost diametrically opposed both in Italia Irredenta and in the Balkans. France had checkmated Italy in Tunis, however, and this, with her support of the temporal power of the Pope, during the period of the Italian struggle for unity, led Italy to make this unnatural and, as later events proved, impossible alliance. It was not to be expected that the other powers of Europe would view this Triple Alliance without concern. France and Russia formed a Dual Alliance (1895), and finally Great Britain, aroused by the threatening naval policy of Germany, abandoned her policy of "splendid isolation" and joined with France and Russia to form a second diplomatic group known as the Triple Entente. Largely through the efforts of Sir Edward Grey, *misunderstandings* among these three were cleared up and a "diplomatic group" established. The precise nature of this understanding was indefinite; no treaty agreement specified its scope. The formation of these two rival groups created a situation in Europe where every disturbance of the political or military status quo brought on a crisis. After 1905, Europe passed through several such crises, each one increasing the tension among the great powers and making the maintenance of peace more difficult.

The first crisis came in 1905, over the situation in Morocco. France in her negotiations with England had been granted a free hand in Morocco, and was engaged at this time in penetrating the country economically and politically. Germany considered this an opportune moment to assert herself and get a "place in the sun." She had definitely abandoned the Bismarck policy of indifference to colonial expansion and had determined to acquire colonies either in unclaimed territory or by taking those already under the sovereignty of another power. On Mar 21, 1905, the German Emperor, while on a voyage to Constantinople, disembarked at Tangier and encouraged the Sultan to reject the scheme of reforms proposed by France. He also succeeded in forcing France to submit the whole Moroccan question to a conference of the powers held at Algeciras in January, 1906. France won a distinct diplomatic victory when England strongly supported her and Italy refused to support her ally. One phase of Germany's policy of colonial and commercial expansion contemplated the extension of Teutonic commercial and political interests in the Balkans and Turkey. In this *Drang nach Osten*, Germany, in conjunction with Austria, hoped to create a great economic if not political sphere of influence, extending through the Balkans to Constantinople and thence through Turkey in Asia to the Persian Gulf. German engineers and German capitalists began to develop Turkish resources. German military officials trained the Turkish forces. In July, 1908, a revolution led by the Young Turks broke out in Constantinople. Taking advantage of this situation, Bulgaria annexed eastern Rumelia and declared her complete independence of Turkey. Austria annexed Bosnia and Herzegovina. Although Italy and Serbia were aroused by this action, Germany stood by her ally, and Russia was too weakened by the Russo-Japanese War to do more than protest feebly. The Teutonic allies had scored a distinct diplomatic success and another European crisis was passed. In 1911, a second Moroccan crisis brought war dangerously near. This was the so-called Agadir incident. It resulted in a compromise by which Germany recognized France's predominant interest in Morocco in return for 100,000 square miles of territory in the French Congo. The same year witnessed the Turco-Italian War, during which Germany was compelled to stand by and permit her protégé, Turkey, to be despoiled by her ally, Italy.

The Turco-Italian War was followed by a widespread upheaval in the Balkans. The Greeks, Bulgarians, Montenegrins, and Serbs, strongly resenting the attempt of the Young Turks to Ottomanize them, patched up their differences and organized the Balkan League. Despite the desire of the large powers to maintain the status quo in the Balkans, the League declared war on Turkey in October, 1912, and defeated her. A second Balkan war followed a dispute over the division of the spoils. Serbia, Greece, and Montenegro combined against Bulgaria and Rumania, and Turkey sided with them. The intervention of the great powers resulted in the establishment of an autonomous Albania under the kingship of Prince William of Wied. Germany and Austria were keenly disappointed as a result of the Balkan wars Turkey had been practically driven from Europe, and the strengthening of the Balkan states and Russian influence in the peninsula checked the plans of Austria to reach the Ægean Sea at Saloniki. Germany's answer to her virtual defeat in the Balkans was the introduction of the Army Bill of 1913, which added 136,000 men and officers to the peace footing of the army. France replied by increasing her military service from two to three years Russia, Austria-Hungary, and even the smaller nations of Europe caught the contagious army fever and either increased the peace footing of their armies or spent huge sums in further military preparations. Germany constructed strategic railways leading up to the Belgian frontier, and Russia projected construction of railways that would facilitate mobilization against Germany. A veritable panic was created in the spring of 1914 by the charges and countercharges appearing in the press of the various interested countries.

Economic Causes. At the close of the eighteenth century there occurred in Europe a complete transformation of industrial conditions, known as the industrial revolution. England was the first country to feel the effects of this change. In time, the industrial revolution reached other countries: France in the period after 1830, the United States in the period after the Civil War, and Germany after 1880. The great industrial interests in these countries began to compete with those of England for the control of the markets of the world. England had the advantage of having vast colonial possessions which might serve both as a market for her manufactured products and as a field for the investment of surplus capital in the development of their natural resources. France and the United States, to a lesser degree, also enjoyed this advantage. Germany, on the other hand, because of her later appearance as a world power, was practically without colonial possessions of any potential power She felt that her industrial development was being hampered through no fault of her own but simply because the best parts of the world had been appropriated by others. Despite this unfavorable position in colonial affairs, Germany prospered commercially and industrially to a marvelous degree. By German apologists for the War, Great Britain is bitterly accused of envying German prosperity and of welcoming the War as an opportunity to crush German industrial and commercial activity. On the other hand, Germany is accused of waging war for economic aggrandizement Two factors worked together to weld the many petty German states into a united nation. One was the army and the other the industrial capitalists. After the Franco-Prussian War, these two groups demanded a protective tariff. The army class, composed almost entirely of landholding aristocrats, demanded a high tariff on farm products and a protective tariff on manufactured articles. Both groups desired to stifle competition in the home market. The tariff adopted in 1879 had far-reaching results. It led to distrust on the part of Russia and Germany for each other In 1904, a 10-year reciprocity agreement was signed, whereby each country made certain reductions in its tariff duties. The Russians felt that the Germans had got the best of the bargain. In 1914, as the date approached for the renewal or modification of the treaty, fear was expressed in the German press lest Russia's improved army would enable her to demand more favorable terms In this fashion the desire of each nation to tax foreign imports and at the same time to obtain free admission of its own products into foreign countries stimulated militarism and provoked war-like sentiments among the powers. The United Kingdom adhered to its free trade policy and with few exceptions admitted the products of all lands on equal footing The British self-governing colonies, however, had adopted protection.

Whether because of the protective tariff wall or because of other causes, the business interests of the Empire prospered mightily. By 1912, British foreign commerce excelled the German by about $1,300,000,000; but German commerce had trebled itself since 1883, while British commerce had not quite doubled. The German government derived rich revenues from the customs duties on an expanding commerce, and viewed with satisfaction the prodigious increase in wealth and population (population increased from 41,000,000 to 66,000,000 between 1871 and 1912) which furnished men and money for an ever-growing army. The landowning and industrial classes considered the army a protection and insurance for their interests. In one respect, however, the German business community was dissatisfied. The German merchant marine, although it had rapidly expanded, was still four times outweighed by British shipping. Great Britain's superiority was ascribed to her earlier economic development, to the fact that Germany had very little Atlantic seacoast and to the superiority of the British navy. Germany, therefore, set herself to overcome these handicaps. Undoubtedly many German businessmen desired the overthrow of the British naval power and the acquisition of an Atlantic seaport such as Ostend in Belgium. Desires just as strong were urging Russia on to Constantinople and the southern Baltic, Serbia on to the Adriatic, and Austria-Hungary on to Saloniki.

In the carving out of a colonial empire, the interests of the industrial and commercial classes also clashed. In the last quarter of the nineteenth century certain groups of businessmen awoke to the opportunities which the vast uncivilized areas of Africa and Oceania offered for the sale of cheap cotton goods, cheap liquors, and other manufactures, for the highly remunerative investment of money in the construction of railways, the development of mines and the traffic in rubber, ivory and oil. King Leopold of Belgium, one of the first to realize the opportunity, acquired control of the Congo region in the heart of Africa. France carved out a

mighty colonial empire, and Great Britain added to hers. Germany, a belated arrival in the field, was permitted, even encouraged by the British government, to acquire territories in Africa; but when Germany challenged the French in Morocco and appeared envious of the British and French possessions, the prospect of a war for world empire began to fill Europe with uneasy forebodings. Concessions as well as colonies were contended for by German, French and British capitalists. For example, when, in 1914, Bulgaria, in return for a loan, arranged to concede to German capitalists valuable railway and mining privileges in Bulgaria, a rival bid was unsuccessfully made by the French. The financing of the Bagdad railroad occasioned considerable rivalry among France, Germany and Great Britain until an agreement was reached Each nation raised an envious outcry when a competing nation secured for itself some new economic plum. In 1914, German interests maintained that they were being outstripped by the other powers; that the English were greedily helping themselves to the oil product of Persia and striving to secure the oil fields of Latin America; that the French capitalists were securing new railway contracts in China, in Russia, and in Greece.

Of all economic interests inimical to peace, the most dangerous was the arms-manufacturing business. In Germany, the Krupps were accused of stirring up hostility between France and Germany in order to obtain larger orders for arms Every army bill, every dreadnought meant profits for the armament firms. The Balkan wars were fought with weapons forged in Germany and France. English firms—Armstrong and Vickers and Witworth—were engaged to build an ordnance factory in Russia and to construct battleships for Spain, for Brazil, for Turkey. For the armament manufacturers of all nations, the War was a golden opportunity.

Finally a word may be added regarding the banking interests and the War. The panic and consternation in financial circles at the outbreak of the War have been cited as conclusive proof that capital did not want the War. While there is doubtless much truth in this reasoning, the fact must not be overlooked that in panics large fortunes are won as well as lost. The huge war loans, moreover, offered unexampled opportunities for financial speculation.

OUTBREAK OF THE WAR AND NEUTRAL NATIONS

The assassination of the Archduke Francis Ferdinand on June 28, 1914, was followed, on July 23, by the presentation of a note to Serbia by Count Berchtold, the Austro-Hungarian Foreign Minister. The note began by recalling the declaration made by Serbia on Mar. 31, 1909, wherein Serbia recognized the fait accompli regarding Bosnia and agreed to renounce any attitude of protest or opposition to the annexation of Bosnia to Austria. The Austrian note then went on to complain that Serbia had not lived up to this undertaking, and had made it necessary for Austria to take action to protect herself against the Pan-Serbian propaganda. Austria insisted that Serbia should make an official and public condemnation of this propaganda and express regret at its consequences The note then submitted 10 specific demands and required an answer from Serbia within 48 hours of the presentation of the note. These demands required that Serbia should suppress every publication that excited hatred of the Dual Monarchy; that the Serbian government dissolve certain societies accused of fomenting the propaganda hostile to Austria; that teachers guilty of instigating hatred of Austria be dismissed and that objectionable matter in the textbooks be eliminated; that Serbia dismiss from her army and governmental employ all officers and officials found taking part in the propaganda; that Serbia accept the collaboration of agents of the Austro-Hungarian government in suppression of the subversive movement against Austria; that Austro-Hungarian representatives be allowed to take part in the investigation of persons in Serbia accused of complicity in the murder of the Archduke; that Serbia take action against two specified officials who were accused of complicity in the crime at Sarajevo; that Serbia take effective measures to stop the smuggling of arms and ammunition across her border; and, finally, that Serbia give explanation of the expressions of hostility toward Austria-Hungary on the part of certain high Serbian officials.

The publication of this note immediately aroused great apprehension in the chancellories of the European powers. It was clear that Europe was confronted by another serious crisis. The first move of Sir Edward Grey, the British Foreign Minister, was to urge on Austria-Hungary the necessity of extending the time limit of the ultimatum. M. Sazonov, the Russian Foreign Minister, strongly supported him in this. Austria flatly refused any extension of time and they then turned their efforts toward the persuasion of Serbia to accept, as far as possible, the demands made by Austria.

The Serbian Reply. The Serbian reply was handed to the Austrian minister on July 25, only two minutes before the expiration of the time limit. Most of the Austrian demands were granted with slight verbal changes. There were two points, however, with which Serbia did not comply: (1) To the demand that Serbia accept the collaboration of agents of the Austrian government in the suppression of the subversive movement directed against the territorial integrity of the Dual Monarchy, Serbia replied that she did not understand exactly the meaning of the demand but that she was ready to accept such collaboration as should conform to the principles of international law and criminal procedure. (The Austrian rejoinder stated that it was not a question of international law but of the exercise of police powers which could be settled by agreement between the parties concerned.) (2) The demand made by Austria that Austrian officials be permitted to take part in the investigation relating to the judicial proceeding in Serbia against persons involved in the Serajevo crime, the Serbian government would not concede, on the ground that such action would violate the Serbian constitution. (The Austrian rejoinder accused the Serbian government of deliberately misrepresenting the Austrian demand, which contemplated simply a participation in the preliminary investigation to the judicial proceedings.) Finally, the Serbian government agreed, in case the Austrian government should find the reply unsatisfactory, to submit the disputed questions to The Hague tribunal or the Great Powers for decision. Austria considered Serbia's reply entirely unsatisfactory. This meant war unless

some unforeseen action of the Great Powers checked it.

The Russian Ambassador to Vienna stated on July 24 that "any action taken by Austria to humiliate Serbia could not leave Russia indifferent." Russia felt that the crushing of Serbia would reduce her to a vassal state of Austria, and that this would imperil the balance of power in the Balkans. In view of this situation the Russian Foreign Minister stated that Russia would mobilize against Austria on the day that the Austrian army crossed the Serbian frontier. This determined attitude rendered futile any efforts the other powers might make to localize the struggle. Germany's position was fairly well defined by repeated statements that it was Austria's affair but, if any other power interfered, her interests were vitally affected. On July 26, Sir Edward Grey suggested a conference of the representatives of the four powers, England, France, Germany and Italy, for the purpose of discovering an issue which would prevent complications between Austria and Russia. To this suggestion France and Italy agreed; Germany, however, declined to fall in with this plan. The German Foreign Minister stated that "a conference such as Sir Edward Grey suggested would amount to a court of arbitration and could not, in his opinion, be called together except at the request of Austria and Russia," and furthermore, that he did not think it (the conference) would be effective, because such a conference would, in his opinion, have had the appearance of an Areopagus consisting of two powers of each group sitting in judgment upon the two remaining powers.

Direct negotiations between Russia and Austria were unsuccessful, Austria refusing to consider a modification of her ultimatum to Serbia. Further efforts on the part of England to have Germany propose some formula which would be acceptable proved unavailing, and on July 28, 1914, Austria declared war on Serbia. This action on the part of Austria appears explicable on one of two grounds. Either she was convinced that Russia was bluffing and would back down, as she did in 1908, or else Austria was prepared, deliberately, to precipitate a European war.

Germany and Russia. Russia had continuously maintained that the fate of Serbia was of great concern to herself, and as a result of the Serbian note she declared partial mobilization against Austria. These military preparations caused frantic efforts on the part of the various governments to prevent a general European conflagration. On July 29, Sir Edward Grey urged that "the German government should suggest any method by which the influence of the four powers could be used to prevent war between Austria and Russia." Italy and France agreed. Germany agreed to the extent of urging Austria to renew her negotiations with Russia. At the same time, Russia was to prepare a formula that would be satisfactory to herself. This was done, but it was entirely unsatisfactory to Austria and Germany. Sir Edward Grey brought additional pressure to bear upon Germany. Germany, on her part, brought pressure to bear on Austria to agree to discuss with Russia the terms of the Austrian ultimatum, and at the last moment, on July 31, Austria agreed to do so. This slender hope of avoiding a world-wide catastrophe was nullified by the demand made by Germany that Russia should cease her military preparations and demobolize her army. Russia made no reply to this ultimatum and at 5 P.M. on August 1, the Russian government was notified that Germany considered a state of war existed between the two countries.

Germany and France. At the same time that Germany presented the ultimatum to Russia, a communication was sent to France informing her of Germany's action and asking what attitude France would take in the event of war between Germany and Russia. An answer was demanded within 18 hours. To this demand the French Premier replied on August 1 that "France would take such action as her interests might require" Despite this unsatisfactory answer the German Ambassador did not leave Paris until August 3. In the meantime, charges and countercharges were made by the French and German authorities that warlike moves had been made on the frontier.

Great Britain and Germany. From the first it was evident that the question of England's attitude in the face of the great European crisis was of the most vital importance. Russia and France continually urged upon her the necessity of coming out definitely and stating that she would firmly support her allies. Sir Edward Grey refused to do this, arguing that he could accomplish more as a mediator. Germany fully appreciated the importance of keeping Great Britain neutral if possible The German Chancellor requested that Sir Edward Grey formulate conditions on which Great Britain would remain neutral. This was declined with the statement, "We must keep our hands free." The British government, therefore, up to the very last day of European peace, refused either to bind herself to come to the aid of France and Russia or to remain neutral. Great Britain's complete entrance into the war came about as a result of the violation of Belgian neutrality, although partial intervention was brought about when, on August 2, Sir Edward Grey informed the French government that the British fleet would protect the northern coast of France from any attack by the German fleet. On July 31, Grey telegraphed the British ambassadors at Paris and Berlin to request the French and German governments to state whether they were prepared to respect the neutrality of Belgium so long as no other power violated it. France replied affirmatively but Germany evaded a direct answer On August 2, the German Minister presented to the German Foreign Minister an ultimatum which stated that Germany had "reliable information . . . of the intention of France to march through Belgian territory," that it was "an imperative duty for the preservation of Germany to forestall this attack." Germany agreed to evacuate Belgian territory as soon as the war was over and to indemnify Belgium for all damages if she would maintain an attitude of "friendly neutrality." In case of refusal, Germany stated, Belgium would be considered as an enemy and the question would be left "to a decision of arms." Belgium refused and called upon the signatories of the Treaty of 1839 to carry out the guarantee of Belgian neutrality. In response to this request, Sir Edward Grey, on Aug. 4, 1914, sent an ultimatum to Germany demanding a satisfactory reply to the request that Belgian neutrality be respected and requiring an answer by midnight of the same day.

Upon Germany's refusal to give such a guarantee, Great Britain declared war on Germany. Despite Germany's efforts to justify the invasion of Belgium on other grounds, to the impartial observer it would appear that Germany's justification must rest entirely on the ground of military necessity. In passing, it might be stated that notes taken by the German Ambassador to London during this critical period, Prince Lichnowsky, were published early in 1918 and caused a sensation in the press of the belligerent powers by their revelation of the friendly attitude of England and her desire to maintain peace in the period just preceding the War.

Italy's Position. At the outbreak of the War, Italy found herself in a most trying position. To Germany and Austria she was bound by the defensive treaty of the Triple Alliance. Her position as a member of this alliance had, from the beginning, been unnatural, largely because of her aspirations in Trieste, the Trentino and the Balkans. In practically all the crises of the twentieth century, Italy stood aloof from her allies. When war broke out in 1914, Italy declared that she would remain neutral. During the next 10 months a struggle went on throughout the entire country between the neutralists and the interventionists. Despite efforts on the part of Germany and Austria to satisfy Italy's demands on the Adriatic, Italy declared war against her former allies on May 24, 1915. See ITALY, *History*.

Japan's Position. Japan's entrance into the War was due to her treaty of alliance with Great Britain. This treaty (1902) largely came about as the result of the loss of the fruits of the Chinese-Japanese War at the hands of Germany, France and Russia. Actuated by motives of revenge for this humiliation as well as by a determination to carry out her obligations to Great Britain, Japan declared war on Germany on Aug. 23, 1914. See JAPAN, *History*.

Turkey. Germanic influence had for a number of years prior to the outbreak of the War been predominant in Turkey. It was natural, therefore, that Turkish sympathies should be with the Teutonic allies. Turkey hesitated, at first, to make common cause with Germany, because of her exposed position and the fact that the two Balkan wars had left her exhausted, but events soon forced her to show her hand, and when, on October 29, the *Breslau*, a German warship which had taken refuge in Turkish waters, bombarded the Russian Black Sea port of Theodosia, Russia broke off diplomatic relations. This action was followed by France and England's declaring war on Turkey on Nov. 5, 1914. See TURKEY, *History*.

Balkan States. Serbia and Montenegro were involved in the War from the first, the latter coming to the aid of the former within two weeks after Austria's declaration of war. The Triple Alliance and the Triple Entente were keenly desirous of obtaining the aid of Bulgaria, Greece and Rumania. In October, 1915, Bulgaria threw in her lot with the Teutonic Allies, frankly stating that the proposals made by them were more alluring than others and expressing the belief that they were going to win the war. (See BULGARIA, *History*.) In Greece, conflicting influences and interests complicated the situation. The King (Constantine) was pro-German, while the Premier, Venizelos, was pro-Ally. The King was strong enough, in the beginning, to thwart the attempts of the Entente to have Greece enter the War on the Allied side. In June, 1917, he was compelled to abdicate and turn the government over to his second son, Alexander. Shortly after this (July 2) the Greek government declared war against Bulgaria and Germany. For the rapidly changing vicissitudes of the Greek government during this period see GREECE, *History*. In Rumania the situation was very similar to that in Bulgaria. The reigning house was pro-German while the majority of the people were pro-French and Italian. The Premier, Bratianu, advocated a policy of waiting, with the intention of entering the war at the proper time, when the greatest reward could be obtained by the least fighting. This policy was continued until Apr. 28, 1916, when the Rumanian Minister at Vienna presented a note to the Austro-Hungarian Foreign Minister which said that Rumania considered herself at war with Austria-Hungary since 9 o'clock the previous evening. See RUMANIA, *History*.

Portugal. Portugal was bound by a treaty of alliance with Great Britain, and, at the outbreak of the War, said she was willing to live up to her obligations whenever Great Britain saw fit. In February, 1916, she seized some German vessels in her harbors, and on Mar. 8, 1916, Germany declared war on her, giving this seizure as the cause. See PORTUGAL, *History*.

The United States. As the largest and most important of the neutral powers at the outbreak of the War, the United States was sure to be vitally affected. As the champion of smaller neutral nations and as the source of vast quantities of war supplies, it was only natural that the attempt to maintain strict neutrality was a trying one. The problem was made more difficult by the attitude of groups of persons in this country whose sympathies were with one or the other of the belligerents in Europe. From time to time, the American government was involved in important discussions with the European powers. The more important of these were, Blockade and Neutral Trade, Interference with Mail, the Sinking of the *Lusitania*, the Mexico Note, and Submarine Warfare and the War Zone. Chiefly as a result of the controversy with Germany over this last subject, the United States declared war against her on Apr. 6, 1917. Shortly after the United States declared war, the following states either severed diplomatic relations with Germany or declared war on her: Cuba, Panama, Costa Rica, Guatemala, Nicaragua, Honduras, Haiti, Brazil, Liberia, Siam and China (qq.v.). For the relations to the war of countries not mentioned in this section, see section *History*, and the articles treating those countries. For convenience, the following dates for the declarations of war are given:

CENTRAL POWERS

Austria against Serbia—July 28, 1914.
Austria against Russia—Aug. 6, 1914.
Austria against Montenegro—Aug 9, 1914.
Austria against Japan—Aug. 27, 1914.
Austria against Belgium—Aug. 28, 1914.
Bulgaria against Serbia—Oct 14, 1915.
Germany against Russia—Aug. 1, 1914.
Germany against France—Aug. 3, 1914.
Germany against Belgium—Aug 4, 1914.
Germany against Portugal—Mar 9, 1916.
Germany against Rumania—Sept 14, 1916.
Turkey against the Allies—Nov. 23, 1914.
Turkey against Rumania—Aug. 29, 1916.

ENTENTE ALLIES

Brazil against Germany—Oct. 26, 1917.
China against Austria and Germany—Aug. 14, 1917.

Costa Rica against Germany—May 24, 1918.
Cuba against Germany—Apr. 7, 1917.
France against Germany—Aug 3, 1914
France against Austria—Aug 13, 1914.
France against Turkey—Nov 5, 1914.
France against Bulgaria—Oct. 16, 1915.
Great Britain against Germany—Aug 4, 1914
Great Britain against Austria—Aug. 13, 1914.
Great Britain against Turkey—Nov 5, 1914
Great Britain against Bulgaria—Oct. 15, 1914.
Greece (provisional government) against Germany and Bulgaria—Nov 28, 1916
Greece (Alexander's government) against Germany and Bulgaria—July 2, 1917
Guatemala against Germany—Apr 23, 1918
Haiti against Germany—July 15, 1918
Honduras against Germany—July 19, 1918.
Italy against Austria—May 24, 1915
Italy against Turkey—Aug. 21, 1915.
Italy against Bulgaria—Oct. 19, 1915.
Italy against Germany—Aug 28, 1916.
Japan against Germany—Aug. 23, 1914
Liberia against Germany—Aug. 4, 1917
Montenegro against Germany—Aug 9, 1914.
Nicaragua against Germany—May 7, 1918.
Panama against Germany—Apr. 7, 1917
Panama against Austria—Dec. 10, 1917
Portugal against Germany—Nov. 23, 1914.
(Passed resolutions authorizing military intervention as treaty ally of Great Britain)
Portugal against Germany—May 19, 1915
(Military aid granted)
Rumania against Austria—Aug 27, 1916
(Allies of Austria also considered it a declaration against them)
Russia against Turkey—Nov 3, 1914
Russia against Bulgaria—Oct. 19, 1915.
San Marino against Austria—May 24 1915
Serbia against Germany—Aug 6 1914
Serbia against Turkey—Dec. 2, 1914.
Serbia against Bulgaria—Oct 19, 1915
Siam against Germany and Austria—July 22, 1917
The Hedjaz (Arabia) against Central Powers—June 9, 1916.
United States against Germany—Apr 6, 1917
United States against Austria—Dec 7, 1917.

New Evidence Concerning the Outbreak of the War. During 1924, a controversy arose concerning new evidence which had come to light since 1919, regarding the outbreak of the War. Usually two or three generations elapse after the close of a war before all the material concerning it comes to light. In this war, however, the overthrow of the governments of Russia, Germany, and Austria-Hungary, and the seizure of documents from the archives of Belgium by the invading Germans, gave many important documents to a waiting world long before they would have appeared in the course of normal events. Added to these have been numerous memoirs and autobiographies which are, of course, of relative value only, but yet shed some light on the diplomatic exchanges just preceding the world conflagration. The new governments which succeeded in the three abovementioned countries were anti-militarist to a large degree, and unhesitantly published any material that would tend to further their aims. When the archives of France, Great Britain, Italy, and the United States are made public, a true history of the month or so preceding the War may be written.

Various interpretations have been placed upon the newly-published documents, although every one agrees practically that they do not alter the fundamental underlying causes of the War, but do, according to one school, led by Prof. Harry Elmer Barnes of Smith College, virtually change all previous notions concerning the placing of the blame for the outbreak of the War; in fact, they deny the truth of the statement, incorporated in the Versailles Treaty, which fixes the responsibility for the War on Germany and her allies. Professor Barnes goes so far as to assess the blame for the outbreak of the War in a graduated manner upon the following countries: Austria, Russia, France, Germany, and England. Belgium was completely exonerated, Italy was only slightly responsible, and it was claimed that the United States was duped into entering a war concerning which she knew little, if anything. Needless to say many eminent authorities disagreed with the conclusion of this school.

MILITARY OPERATIONS

General Considerations. The War that broke out in July, 1914, involved three continents and the seven seas. Beginning with the declaration of war on Serbia by the Austro-Hungarian Empire, in a few days it spread to involve Germany, France and Russia. With the announced invasion of Belgium by the German armies, Belgium and Great Britain took up arms. Military operations began on three European fronts—the Western or Franco-Belgian, the Eastern or Russian, and the Southern or Serbian. Turkey next entered the War toward the close of 1914. In May, 1915, Italy joined the Allies and a new front of operations opened on the Austro-Italian frontier. In November of that year Bulgaria joined the Central Powers, the Serbians were driven from their country and a new front of operations was established on the Greek frontier north of Saloniki. In August, 1916, Rumania joined the Allies and a new front was established on the Rumano-Hungarian-Bulgarian frontier. The conquest of the German colonies in China, South Africa, and the islands of the sea began soon after the outbreak of War. In 1916, Portugal joined the Allies and sent a corps to the Western front. In 1917, Greece and the United States joined the Allies; the troops of the former being employed on the Salonikan front and those of the latter mainly on the Western front

In this War, every known resource of mechanical ingenuity was drawn upon; old and forgotten methods of warfare were brought into play side by side with the most powerful modern artillery, while aëronautics and poisonous gases for the first time had occasion to show their worth The edifice of international law so painfully built up after centuries of struggle was toppled over as a thing of no account. Again it was demonstrated that, in a long war, the side with appreciatively greater resources in men and materials of war will win if the people, their governments and military commanders have sufficient courage to endure temporary defeats and discouragements.

In the space available, nothing but a statement of the principal facts can be attempted, but the nature of the struggle on the Western front calls for a word of two. When both forces simultaneously reached the Channel after the battle of the Marne, there began a siege over the whole front that gave the struggle in this theatre a character unique in military history. At certain places in the "line," 32 or more parallel lines of German trenches were constructed. Similar defenses existed on the Allied side. Frontal attacks became a necessity since flanks there were none, and yet these attacks for years proved failures because the experiences gained under the new conditions had not as yet led to such disposition of resources as would carry them to a decision. The most desperate efforts were made first by one side and then by the other to raise the siege, so to speak, by a concentration at some selected

point and thus break through to open warfare and end a situation that only a few years before would have seemed intolerable. It was not until the summer of 1918, after the Germans had made their last and greatest attempt and the Allies had been reinforced by the American troops, that a break-through was effected and the War brought to a close. On some of the other fronts, the phenomena of what might be called old fashioned warfare were more or less produced but in general there was a marked tendency to approximate to the conditions on the Western front.

A marked feature of this War was the so-called mobilization of industries. So great was the draft made on the industrial resources of the countries involved that the struggle, other conditions being equal, may be said to have resolved itself into a competition, each side striving to outstrip the other in supplies and munitions.

General Strategy. In a description of a war in which many fronts are involved, it is necessary to treat the operations on each front separately; but as these were parts of a general whole and as all were more or less related, it seems best to preface these descriptions by a short description of the operations as related to each other in time and in strategy.

Plans for a possible war between the Triple and Double Alliances were prepared long before the War by the coördinating staffs of the armies. These plans were revised from year to year to conform to new conditions. On both sides the plans contemplated offensive campaigns. That of the Triple Alliance provided for an invasion of France in which about nine-tenths of the German forces were to be employed, assisted by corps of the Italian army not required for the defense of the Franco-Italian frontier. A small fraction of the German army with the entire Austro-Hungarian army was to be employed on the Russian frontier. In order to avoid the delay that would be occasioned by a frontal attack on the French frontier fortresses that formed two strong barriers, Verdun-Toul and Epinal-Belfort, it was proposed to make the main thrust to the north through Belgium and Luxemburg and force the French to fight in the open country which forms the basins of the Oise, Marne and Seine rivers and their tributaries. It was assumed that the French, at the beginning of operations, would invade Lorraine from Epinal and Toul, a line along that frontier was therefore selected to be organized for defense and a part of the German force in the west was assigned to its defense. It was thought that this French force would soon be withdrawn to meet the attack from the north The invasion of Belgium would probably cause Belgium and Great Britain to declare war, but the Belgian army was not a strong one and Great Britain had only a small force that could be used in the first operations. It was hoped that in France such a decisive victory would be won as would compel France to sue for peace, in which case it was thought that the war would end. Should Russia continue the war, practically the whole German army would be available on that front. In August, 1914, however, it was known that Italy would not take part in the operations and Austria was already engaged in a war with Serbia, and could not at once employ her whole army against Russia. Confident that their plans for a decision in the west could be secured before Russia could appear in force in the east, the Germans declared war. It was not many days after the beginning of operations that the Germans realized that operations were not going as anticipated, in spite of their first victories, and that their flanking operations on both flanks had failed. Their western armies were weakened, (1) by the necessity of detaching troops to watch the Belgian army, which had wisely avoided risks in the open field and retired to the fortress of Antwerp, ready to attack the German communications; (2) by the necessity of detaching troops to invest a number of French fortifications which with their garrisons were left in their rear; and (3) by the necessity of sending troops from the West front to East Prussia where the Russians had invaded that province sooner than had been expected. The German plan was completely shattered by the unexpected battle of the Marne. From then to the close of the year, the Germans made a number of attempts to outflank the French line, but without success; and at the close of the year, the two armies lay behind intrenched lines extending from the Channel to Switzerland and open warfare was no longer possible for either side until the opposing line was penetrated on a very wide front.

The Franco-Russian plan proposed a simultaneous advance of the entire French army in the west and the Russian in the east to compel the Germans to divide their army into fractions each of which would be smaller than the Allied army opposing it. Long before the War, it had been noticed that the Germans were building detraining stations along the Belgian frontier. This indicated a German movement through Belgium, though it might be only a ruse After the formation of the Triple Entente, in view of a possible German movement through Belgium which would probably cause Great Britain to declare war, the coördinating staffs of France, Belgium and Great Britain made plans to meet this situation. However, the French military authorities could not count on the German invasion of Belgium, since it was possible that the Germans would advance directly over the Franco-German frontier. Their plan was, therefore, at the outbreak of the war, to move their troops to the Franco-German frontier but also to provide an alternative to meet the changed conditions caused by the German invasion of Belgium. The shifting of troops to meet the invasion of Belgium would necessarily delay the French offensive but it would be compensated for by its reinforcement by the Belgian and British armies. There was much discussion in France of this German invasion of Belgium, and opinion was divided as to whether the Germans would advance through southern Belgium only, avoiding the fortresses of Liége and Namur, or advance across the Meuse also on either side of Liége and attack the two fortresses. The French plans contemplated only an advance through southern Belgium and trusted that the two fortresses would hold out long enough to permit the French and British to go to the assistance of the Belgian army. In any case, the Belgian army was to avoid the risk of capture in the open field and take refuge in the fortress of Antwerp.

The Germans announced their intention of moving through Belgium immediately after declaring war on France and two days later were

at war also with Great Britain and Belgium. The French troops, therefore, were deployed along the frontier, according to the second plan. As soon as the troops were in position the French offensive began along the entire front but was shattered on the entire line except in upper Alsace, which was an unimportant front. The Belgian army took refuge in Antwerp and the British and French began a retreat from Belgium across the frontier in order to permit troops to be withdrawn from the French right, which was strong, to the left, which was weak, in order to resume the offensive. This favorable opportunity for resuming the offensive along the entire front did not occur until the armies were south of the Marne with the flanks resting on the fortresses of Verdun and Paris, when the battle of the Marne took place and the German armies were compelled to retreat. At first it was believed that the German armies would retire to the frontier but in a few days it was found that they had taken a strong position on the Aisne, which was extended eastward to the Meuse north of Verdun and could not be dislodged Then began the flanking operations that closed when the western flanks rested on the Channel. On the Eastern front just as the German armies were marching into Belgium, the great Russian offensive began and two strong armies advanced into East Prussia and four into Austria The small German force could not resist the advance and advised German Headquarters that it might be necessary to withdraw from East Prussia. However, under a new commander, in the battle of Tannenberg one of the Russian armies was decisively defeated with great loss and with the assistance of the corps sent from the west, the other was driven back across the frontier. In the Austrian province of Galicia the four Russian armies advanced slowly and steadily, overcoming all resistance; their crushing operations were likened by the press to those of a steam roller. Their cavalry was already threading its way through the passes of the Carpathians into Hungary when German Headquarters sent from the intrenched fronts in the west troops to assist the Austrians. The Russians had to cease their advance against the Austrians to meet the German advance in centre Poland. Here the lines swayed back and forth between the frontier and the Vistula River to the close of the year, when, as in the west, both armies were intrenched for the winter. On the Southern front the Austrians undertook two punitive expeditions into Serbia, both of which ended disastrously for the Austrians. The Serbians made no attempt to cross the frontier and thus operations on this front died out.

The first year had brought no decision. Both sides had experienced severe losses and had used up most of their reserve supplies of munitions; at its close the munitions problem assumed great importance It was a particularly serious one to Great Britain, who was faced by the necessity of raising and maintaining an army equal to that of France. The advantages of the interior position occupied by the Central Powers became apparent as soon as the lines were intrenched. Under cover of the intrenchments, reserves could be shifted rapidly from the Western to the Eastern frontier due to the fine railway system of Germany.

At the beginning of 1915, the Allies still had hopes that success could be secured through the great Russian armies and operations on the Western front were confined mostly to attacks here and there to prevent the Germans from sending troops from the west to the east. Only once did they make an attack with the hope of breaking through on a wide front. On the Eastern front the Germans found the situation far from satisfactory as the Austrian armies were greatly demoralized. To restore confidence, it was necessary to dislodge the Russians from their threatening position so that if necessary some of the troops could be returned to the Western front. In May, therefore, began the great drive in the east The Russian line was broken in the south and the Russian armies in Austrian Galicia were in full retreat. To check this disaster and draw troops from this front, the Allied Powers pursuaded Italy, who had been listening to the diplomats of both sides, to declare war against the Central Powers. War was declared on May 23 and the Italian armies were deployed on the Austro-Italian frontier. The Italian declaration of war did not have as great an effect as the Allies hoped Although the Austrians were compelled to detach troops to go to the new front, that front was already well intrenched and the drive against the Russians had gained such a momentum that it still went on. The Russians were driven back across the frontier and lost all their frontier fortresses on the Niemen, Narew, Vistula, and Bug Rivers. When the drive ceased about the middle of September, near the Baltic the Russians were behind the Duna River between Riga and Dunaburg. From Dunaburg the line ran straight south to the Dniester River. As soon as the armies ceased active operations, the line was intrenched. The Russians had experienced tremendous losses in men and munitions of war; the former could be readily replaced but not the latter because of the isolated position of Russia. The Russian army could again resume the offensive under favorable conditions but all hope that it would be the decisive factor in the War on the side of the Allies had to be abandoned. On the Italian front nothing worthy of note occurred during the year.

War between Turkey and the Allied powers was declared in November, 1914, and soon developed on four fronts. In Armenia, the Russian Caucasian army invaded Turkey in November to capture Erzerum. In December, it was defeated between Erzerum and the frontier and retired pursued by the Turkish eastern army. The Turks in turn were defeated in January and operations on this front ceased, as neither the Russians nor the Turks could spare forces from other fronts to reinforce these armies In Mesopotamia, in November, 1914, the British Indian government landed a force near the mouth of the Tigris River primarily to protect the oil fields in southwestern Persia. This force was gradually increased and slowly made its way up the Tigris River, meeting with slight resistance. In the latter part of September, it captured and occupied Kut. Bagdad was now only 100 miles distant and the temptation to effect its capture proved too much for the commanding officers of the Tigris Expeditionary Force. With a little more than a division, the attempt was made in November, but before the force reached Bagdad it was attacked by a superior Turkish force and in a few days found itself back in Kut invested by

the Turks. In the west in January, 1915, the Turks assembled a small army in southern Palestine for the purpose of crossing the Sinai Desert and the Suez Canal, possibly in the hope of raising an insurrection in Egypt That it ever got across the desert is a marvel in itself and would have been impossible except for the favorable condition of the desert wells. A few boatloads of troops actually got across the canal The army was unable to maintain itself along the canal and retired leaving detachments to guard the scattered wells.

The most important operations in Turkey in 1915 were those connected with the ill-fated Gallipoli Expedition. The opening of the Turkish straits to secure communication with Russia and the destruction of the Turkish Black Sea fleet must have appeared as important strategic objectives as soon as Turkey entered the War. Whether this could be best effected by an attack of the defenses of the Dardanelles directly or obtained as a result of operations from a point on the Turkish coast farther south was not so clear There were also some who argued that a decision on the Western front was impossible for some time, as it would take time to solve the munitions problem and in the meantime it would be better to attack the Turkish armies and compel Turkey to make peace. Owing to the requests of both British and French commanders on the Western front for more troops, it was difficult to find troops for any new expedition In Egypt, however, were the Australian and New Zealand troops being trained for war, a division of Territorials from England and some troops from India. After the defeat of the Turkish desert expedition, these became available but as they were untried troops it was desirable to have at least one division of regulars. This was slated for France but, after the first great offensive of the British failed at Neuve Chapelle, it was decided to send the division to Turkey. The Dardanelles operations began with a naval attack to force the entrance, which failed. It was followed some time after by the landing of British and French forces (April 24) to capture the Gallipoli Peninsula. In the meantime the Turks had been warned and met both the landing of troops and the subsequent operations to capture the peninsula with such obstinate resistance that in November it was decided to abandon the project and withdraw the troops. Most of the British troops returned to Egypt and were later sent to other fronts The Allies had hoped that the Greek army would assist in the Gallipoli operations, but in this they were disappointed.

As soon as Turkey entered the War, Bulgaria occupied a very strategic position; it became even more important when the Allies landed at Gallipoli. If she joined the Allies and threatened Constantinople it would cause the Turks to reinforce that front and weaken their resistance at Gallipoli. It would cut Turkey from all communication with her two allies and might cause her prompt surrender. On the other hand, if she joined the Central Powers it would enable them to open direct communication through Serbia and Bulgaria with Turkey and give them the advantage of interior lines to all fronts. The diplomats of both sides therefore began a contest to win Bulgaria but in this contest the Allies were handicapped by the enmity between the Bulgarians and Serbians as a result of the Balkan War and by the successful campaign of the Central Powers in Russia. Bulgaria probably entered into a secret agreement to join the Central Powers in September, 1915, as the Germans and Austrians both withdrew troops from other fronts and in the latter part of that month each concentrated an army on the Serbian frontier. The two armies invaded Serbia early in October and were soon joined by the Bulgarians. It was all the Serbian commander could do to save his armies, which he did by crossing the mountains in winter and reaching the Adriatic with sorely depleted ranks. On the island of Corfu the Serbian army was reorganized.

To protect the Serbian retreat, which it was hoped could be effected in the direction of Saloniki, both British and French landed forces at that point where they began the construction of a great intrenched camp. The armies of the Central Powers did not cross the Greek frontier and shortly thereafter most of the German and Austrian divisions were withdrawn from Bulgaria. The international railway through Serbia to Constantinople was put in operation.

The operations of 1915 had increased the number of fronts and the number of countries engaged in the War but had brought no important decision on any front. During 1915, the British force on the Western front was greatly increased and was able to relieve the French on a much wider front. At the close of the year the British had three armies on this front, each composed of three corps, each stronger than a French corps. This permitted the French to withdraw some of their armies and place them in reserve.

The Allied plan for the Western, Eastern and Italian fronts for 1916 was to remain on the defensive until the Russian army could be reorganized and then assume the offensive simultaneously on all fronts. Rumania had until now remained neutral but in this year promised to declare war on Austria and invade Hungary as soon as her armies were ready. Before she acted, however, the Allies were to begin an offensive from Saloniki and thus keep the Bulgarian forces on that front. In this offensive the Allies again counted on securing the assistance of the Greek army. In Turkey the Russians promised to renew the invasion of Armenia and thus assist the British in their operations to rescue the British force invested in Kut. Some of these plans had to be modified, as the Central Powers took the initiative this year.

The Germans planned to remain on the defensive on the Eastern front and again assume the offensive in the west. Their drive this time was against the fortress of Verdun whose capture would have an important effect on the morale of the French nation. The Austrians were requested to remain on the defensive on both the Russian and the Italian fronts, but they would not consent to this and planned an offensive campaign against the Italians from the Trent region. In Turkey the principal operation planned was the capture of the British force in Kut. On other fronts the Turks were to remain on the defensive.

The Verdun offensive, which developed into a great offensive on both sides of the Meuse and from first to last employed a very large fraction of both the German and French forces in the west, failed in its purpose although the Germans almost reached the town. It lasted from the middle of February until the middle of July.

While it was in progress, a fourth British army took its position in line to enable French troops to go to Verdun. In May the Austrian offensive in Italy took place and the Austrians advanced from the Trentino and almost reached their objective, which was the Italian plain in the rear of the Italian armies on the Isonzo. Knowing that to raise this attacking force the Austrians must have withdrawn troops from the Russian front, the Allies requested Russia to attack the Austrians on their front. The Russians attacked on a broad front and the Austrian line immediately gave way, and the Russian advanced about 40 miles on a front 80 miles. To check the Russian advance, German and even Turkish troops were sent to the Austrian front and the Austrians were obliged to send back troops from the Trentino.

It was while the Russians were still advancing that the British and French made their great offensive in the west—the Somme drive—to relieve the pressure on Verdun, assist the Russians and Italians, and also prepare for the entrance of Rumania into the War by keeping the German forces employed. This great offensive began July 1 and lasted into November. It enabled the French to make counterattacks in the Verdun sector in October and December and recover a part of the territory captured by the Germans in the first half of the year. The Russian offensive enabled the Italians to advance along the Isonzo and capture the town of Goritza in August.

In the intrenched camp of Saloniki, there were assembled the reorganized Serbian army, a number of British and French divisions and a Russian division. This force was placed under a French commander, Serrail, and about August 1 he began the offensive which was to precede the declaration of war by Rumania. Again the Allies requested the assistance of the Greek government, which was refused; and lest the Greek army should prove a menace in their rear, the Allies forced the Greek government to demobilize its army. The fact that the Allied armies at Saloniki were in Greek territory and Greece was still neutral made a complicated situation. The offensive began August 1 and continued until November. The Rumanians expected the advance to be into Bulgaria but in this direction the Allies made no headway. They did, however, penetrate Serbia and recapture Monastir.

Rumania declared war August 27; at this time the Western front was ablaze with the Somme drive in the north and the Italian offensive in the south and the Central Powers could withdraw no troops from those fronts. On the other hand, the operations on the Russian front had subsided and the Saloniki drive had made no appreciable effect on that front. The Central Powers, therefore, were able to assemble two armies under German commanders to meet the new offensive; one formed of German, Bulgarian and Turkish troops was assembled in Bulgaria and another of German and Austrian troops in Hungary. At first the Rumanians swept over the mountains into Transylvania but they had to be recalled when the hostile army penetrated Rumania south of the Danube River from Bulgaria. The other hostile army then penetrated the mountains and reached the Rumanian plain from the north and the two armies united in front of the Rumanian capital, Bucharest. The Central Powers were able to drive the Rumanians out of southern Rumania but aided by Russian troops the Rumanians were able to hold eastern Rumania. Operations in Rumania ceased at the end of the year.

In Armenia the Russian armies crossed the frontier and in succession captured Erzerum, Trebizond and Erzingan; a further advance into a mountainous country without railways proved impossible and the advance stopped about the middle of the year. At this time the Turks were busily engaged farther south with the British forces on the Tigris. After the fall of Kut in the last of April, active operations on the Tigris ceased until the close of the year, which enabled the Turks to turn their attention to the Russians, whom they compelled to evacuate a part of the territory in their possession. The British government was dissatisfied with the conduct of affairs on the Tigris by the Indian government and they were transferred to the Imperial General Staff. Troops were sent to this section from Egypt and efforts were made to rescue the British troops in Kut. All attempts made during the first part of 1916 failed and on April 29 the garrison surrendered. British prestige could not allow the situation to end in this manner, so during the remainder of the year preparations were made for an advance on Bagdad as soon as winter came and the weather was favorable. On the desert front, the British troops occupied posts on the east bank of the Suez Canal and began the construction of a railway along the coast in preparation for an invasion of Palestine. The Turks made several futile attempts to interfere with railway construction but the work went steadily on and at the close of the year was within 15 miles of El Arish, the Turkish frontier post.

In 1916, in spite of elaborate preparations and combinations there had been no decision on any front. The Allies had been reinforced by Rumania and Portugal but only one corps of the latter country was sent to the Western front, where it was attached to a British army. For the Allies the situation in the east was very unsatisfactory and French officers were sent to reorganize the Rumanian army. In June, 1916, Lord Kitchener started for Russia to study the situation there but was lost at sea. Of the Central Powers, Turkey had about reached the end of her resources and Austria was rapidly approaching the same state. In all the Central states there was a feeling of depression due to the length of the War and to the realization of the superiority of the Allies in men, wealth and resources. The blockade was daily becoming more oppressive. No longer confident of winning on land, German Headquarters decided to win at sea by an unrestricted war by its U-boats on all vessels, hostile and neutral bringing supplies to Allied ports. On land the operations were to be defensive primarily.

In 1916, the British army reached its maximum strength and now the Allies were superior both in artillery and aircraft. The condition of the Turkish and Austrian armies was known and the Allies confidently expected to end the war in 1917 although it was known that no great effort could be expected from Russia or Rumania. On all other fronts a vigorous offensive was planned. To forestall the Germans and take advantage of the wedge driven in the German line by the Somme drive, an at-

tack was to begin early in the year. This salient was to be the centre of attack, which was to be extended far north by the British and to the east as far as Reims by the French. It was confidently believed a break-through would result. As in 1916, the Germans secured the initiative, not, however, by an attack but by a retreat. About the middle of March, on the entire front from the vicinity of Arras to that of Soissons, they fell back to a new line selected and intrenched that winter, which at one point was 25 miles behind their original line. As they retreated they destroyed everything of military value to the Allies and blocked all the roads. This retreat strengthened the German position by shortening the line to be held. As it would take some time for the Allied armies on the front that had been evacuated to make preparations for a new attack, it was decided to make a British attack to the north and a French attack to the east. The British attack met with considerable success but was not a break-through; the French attack was repulsed. The French commander had been so confident of success and had promised so much that his repulse had a serious effect on the morale of the French army. The morale was restored by two successful attacks under a new commander in August and September on small fronts. During the remainder of the year, the British engaged in two other offensives, one east of Ypres and the other at Cambrai, in which ground was gained but no decision was secured

In Russia, conditions both in the government and the army were becoming more chaotic The Czar abdicated and the Kerensky government came into power Of the armies, only the southern group remained a fairly disciplined army and with these the Russians assumed the offensive in July; at first successful, under counterattacks they quickly crumbled and for the first time in the War retired behind the border on that front In the north the Germans captured Riga. When the Kerensky government fell in December an armistice was declared on that front.

The Italians fought with great vigor and with considerable success until the end of September, when, due to heavy losses, offensive operations closed From the point of view of the Central Powers the situation seemed so desperate that a German army was sent to this front. With this army as the spear point a counter-offensive was begun in October, the Italian line was pierced and the Italians were compelled to retreat until they reached the Piave River far in the rear. Here they were reinforced by French and British troops and the retreat was stopped.

Practically nothing was done on the Saloniki front during the year. In June, the Allies compelled the King of Greece to leave the country; the government was reorganized and in July declared war on the Central Powers. The remainder of the year was spent in reorganizing the Greek Army and bringing it to the Salonikan front.

Practically nothing was accomplished on the Rumanian front and when in December the Russians agreed to an armistice with the Central Powers the Rumanian government was obliged to do the same.

The greatest Allied successes of the year were gained by the British in Turkey. The campaign in Mesopotamia began in December, 1916, and in the latter part of February the Turks were manœuvred out of Kut with its strong defenses and retired on Bagdad. The British followed and entered Bagdad, March 11. The British now consolidated their hold by occupying the country for a considerable distance around Bagdad. On the desert front, the British reached Rafa with their railroad and troops early in 1917. Their objective now was the Turkish frontier position of Gaza, upon which they made two unsuccessful attacks in March and April. The advance was then postponed until the end of October. The Turks were now manœuvred out of this position and retreated rapidly northward followed by the British. Jaffa was evacuated by the Turks on November 15 and Jerusalem on December 9 In Turkey, resistance was practically broken and the end was in sight.

Although there had been no decisive events on any front save that of Turkey, the War was nearer its end than any one anticipated—the U-boat warfare failed to secure decisive results, but had caused the United States to declare war. The entrance of the United States in the War produced immediately a tremendous effect on all the countries engaged in it. With the enormous resources of this country in men and materials added to their own, the Allies were sure to win The only question in doubt was when the Americans would be ready.

For the year 1918, the Allies proposed to remain on the defensive on the Western front until the Americans were ready to take the field in sufficient force. On the Italian front it was necessary to remain on the defensive until the Italian Army was reorganized On the Salonikan front and in Palestine the offensive was to be resumed as soon as practicable.

The Central Powers could not remain on the defensive. Failing to win the war by U-boat operations, they were obliged to again try it on land. Little could be expected of the Bulgarians or Turks, who were necessarily on the defensive, but as the Russians and Rumanians were no longer at war the troops on these fronts could be greatly reduced and thus a striking force could be assembled by the Germans and Austrians on the Western and Italian fronts.

The Germans had been preparing for this last offensive during the winter as they wished to launch it as early in the year as possible. They attacked on the Western front and in succession three great wedges were driven in the Allied lines, but the lines were not actually broken. All attempts to connect or extend the areas gained in these attacks failed. The successive attacks lasted from the middle of March to the middle of July. Then began the Allied counterattacks and by the middle of September the Germans were practically back in their original lines with greatly shattered forces. The final campaign began towards the end of the month and ended with the Armistice, November 11.

The Austrians made their great attack on the Piave May 15–22 and met with a repulse. After this they were completely discouraged and when the Italians made a counterattack on October 24 they offered little resistance, as they realized that the War was practically over; Bulgaria had surrendered and the German armies were in retreat.

The advance from Saloniki began September 14 and here too the Bulgarians offered little

resistance as they realized that with the Germans in retreat the War was practically lost. On September 30, war was over on this front.

In Turkey, the British Palestine army was not able to undertake offensive operations until the latter part of September because during the first months of the year it was necessary to develop the railways and secure supplies. Then in April, to meet the German attacks in the west, a large number of troops were withdrawn from this front and sent to reinforce the British armies in France; they were replaced by Indian troops from Mesopotamia and other points. The advance was begun in the latter part of September and in a few days the Turkish armies in front were either captured or dispersed. The Turkish armistice was signed October 30.

For technical discussions of the conduct of the War, see the following articles: ARTILLERY; ORDNANCE; TRENCH WARFARE MATERIAL; SMALL ARMS AND MACHINE GUNS; EXPLOSIVES; STRATEGY AND TACTICS; ARMIES AND ARMY ORGANIZATION; CHEMICAL WARFARE. See also the articles AFRICA; ARABIA; PERSIA; etc., for accounts of special phases of the War.

THE WESTERN FRONT

Mobilization and Concentration. For operations on the Western front, Germany mobilized 35 active and reserve army corps, 4 cavalry corps and 25 Landwehr brigades for field service besides a number of divisions assigned to the defense of her western fortresses. The field troops were organized into seven armies, all of whom were to be on her western frontier on August 16 ready for active operations.

	Army corps	Landwehr brigades
I Army—von Kluck	7	3
II Army—von Bulow	6	2
III Army—von Hausen	4	1
IV Army—Crown Prince Wurtemberg	5	1
V Army—Crown Prince Germany	5	5
VI Army—Crown Prince Bavaria	5	6
VII Army—von Heeringen	3	7

During the preliminary operations, the four cavalry corps were under German Headquarters but later were assigned to the armies: 1st to II army, 2d to I army, 3d to VI army and 4th to V army.

The I and II armies were to invade Belgium and cross the Meuse River between the Holland frontier and Namur. The III, IV and V armies were to cross southern Belgium and Luxemburg and reach the Meuse River between Namur and Verdun. The VI and VII armies were to occupy an intrenched position along the French frontier south of Metz to meet any French advance into Lorraine. To the II army was assigned the task of capturing the fortress of Liége and to the II and III armies that of Namur. To the I army was assigned the task of dealing with the Belgian army and outflanking the French and British armies.

Belgium mobilized her six divisions and sent one to defend Liége and another to defend Namur. From the others she formed a small field army.

France mobilized her 21 active corps, a colonial corps, 25 reserve divisions, 10 cavalry divisions, and several Territorial divisions. The active corps were organized into five armies:

	Army corps	Cavalry divisions
I Army—Dubail	5	2
II Army—Castelnau	5	2
III Army—Ruffey	4	1
IV Army—Langle de Cary	5	1
V Army—Lanrezac	3	1

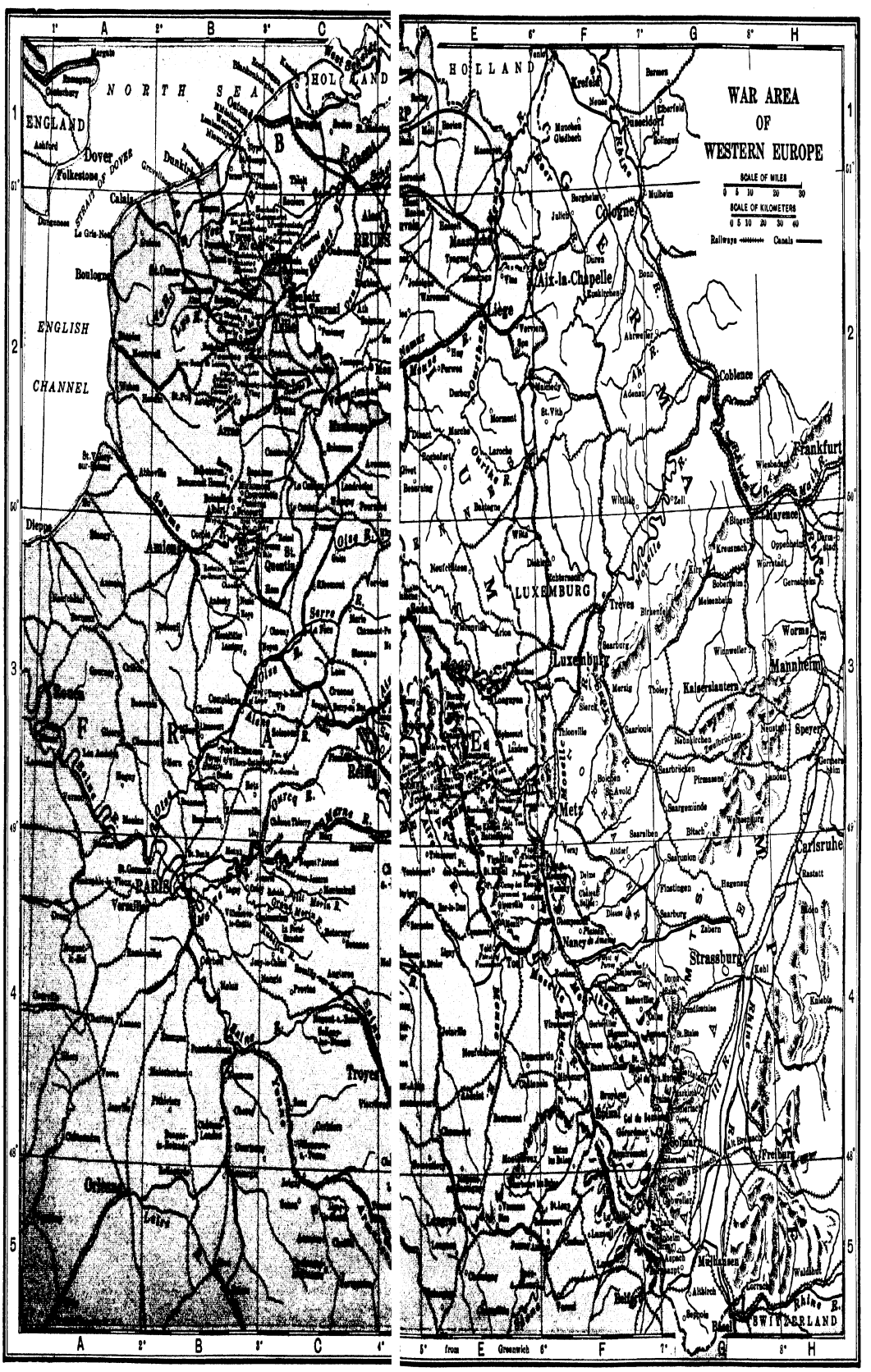
Three cavalry divisions were formed into a separate corps—Sordet—subject to the orders of the French commander-in-chief, Joffre. Some of the reserve divisions were assigned to the armies and the others to the frontier fortresses and to the defense of Paris.

The I army covered the frontier from Belfort to the north of Epinal; four of its corps were on the left ready to invade Lorraine with the II army. The II army had four corps in front of Nancy and one in reserve. The III army was in front of Verdun ready to advance into Lorraine north of Metz. Between the II and III armies was a so-called VI army—Manoury—consisting of three or four reserve divisions designed to invest the fortress of Metz. The V army was on the Meuse River between Mézières and Verdun, guarding the flank of the III and ready to support it. The IV army formed a general reserve behind Verdun ready to support either the II or III army. The position of the armies was based on the possible concentration of the German armies on the Franco-German frontier. Should the Germans violate the neutrality of Belgium the plan provided for the movement of the V army northward into the angle between the Sambre and Meuse Rivers; the IV army was then to replace the V army on the Meuse between Mézières and Verdun.

Battles of the Frontier. It was Joffre's plan to assume the offensive as soon as his armies were in position. The I and II armies were ready on August 15, and having organized a VII army—Pau—from the corps and reserve divisions around Belfort, he ordered the VII, I and II armies to advance. The VII army met with slight resistance and advanced until recalled by the defeat of the I and II. These two armies advanced and on August 20 encountered an equal force of the VI and VII German armies occupying a strong position near the frontier. The French attack being repulsed the French armies retired slowly and took an equally strong position on the Meurthe and Mortagoe Rivers guarding the Charmes gap between Nancy and the Vosges Mountains. The Germans were unable to break the line and each army was practically engaged in holding the other until the battle of the Marne was over. The Germans then retired to an intrenched line near the frontier in order to release some of the corps. The battle was known as that of Lorraine or Charmes.

As soon as the IV French army was in position and had received further reinforcements, the III and IV armies were directed to cross the frontier into Luxemburg and southern Belgium and break up the German troops moving through that area. In the forest of Ardennes they encountered an equal force of the IV and V German armies, August 22, and here, too, the French were compelled to withdraw. This battle was known as that of Ardennes.

The V French army moved up in the angle of the Meuse and Sambre Rivers and posted one


WAR AREA
OF
WESTERN EUROPE
SCALE OF MILES
0 5 10 20 30
SCALE OF KILOMETERS
0 5 10 20 30 40
Railways
Canals
NORTH SEA
HOLLAND
ENGLAND
ENGLISH
CHANNEL
Dover
Folkestone
Calais
Boulogne
Dieppe
Amiens
PARIS
Versailles
Orleans
Tours
Rouen
Le Havre
Cherbourg
Caen
Metz
Nancy
Toul
Verdun
Sedan
Reims
Troyes
Belfort
Strassburg
Colmar
Freiburg
Mulhausen
Basel
SWITZERLAND
LUXEMBURG
Luxemburg
Trier
Coblenz
Frankfurt
Mayence
Worms
Mannheim
Carlsruhe
Speyer
Kaiserslautern
Saarbrücken
Aix-la-Chapelle
Cologne
Liege
Namur
Brussels
Ghent
Antwerp
Rotterdam
Amsterdam
Arnhem
Nimeguen
Utrecht
Krefeld
Duisburg
Dusseldorf
Elberfeld
Bonn
Wiesbaden
Darmstadt
Heidelberg
Karlsruhe
Freiburg
Basel
Rhine R.
Meuse R.
Moselle R.
Saar R.
Seine R.
Somme R.
Oise R.
Aisne R.
Marne R.
Yser R.
Lys R.
Scheldt R.
Ourcq R.
Ardennes
Vosges
Jura
Alps
Black Forest
Rhine Valley
Maginot Line
Siegfried Line
from Greenwich

corps along the Meuse and the other two along the Sambre. In this section the French cavalry corps had endeavored to ascertain the German forces east of the Meuse but was unable to penetrate the cavalry screen formed of the 1st and 4th German cavalry corps. The V army was reinforced by this cavalry corps, a corps from the II army, two divisions from Algiers and three reserve divisions. As soon as it received its reinforcements and the British army arrived on its left, it was to cross the Sambre River and attack the Germans there.

The British mobilized their so-called Expeditionary Force consisting of six divisions and a division of cavalry. Four of these divisions, the 1st and 2d army corps, with the cavalry were at once sent to France and detrained in the vicinity of the fortress of Maubeuge.

On this front the Germans secured the initiative and made the attack. Early in August troops of the II German army attempted to capture Liége by surprise. They did succeed in taking the town with its bridges but were obliged to reduce the surrounding forts with heavy artillery The last fort fell on the day the armies were ready to advance. On the 17th, the I and II armies moved out and on the 20th were on the line Brussels-Namur; the III army started for the Meuse south of Namur. One corps each of the II and III armies was assigned the task of investing this fortress while it was being reduced by artillery. The I and II armies were preceded by the 2d cavalry corps while the 1st covered the advance of the III army. When the III reached the Meuse the 1st cavalry corps was to move around Namur and join the II army The Belgian army offered no resistance to the advance but retired to Antwerp.

Before the V French army had received its reinforcements it was attacked by the II German army on August 22, and lost the line of the Sambre River, on the following day it was again attacked by the II and its rear threatened by the III which succeeded in forcing the Meuse in its rear There was nought to do but retreat, which began on the 24th. This battle is known as Charleroi.

While the II German army was advancing to the Sambre, the I army with its cavalry division was seeking the British army whose position was unknown While moving in a southwesterly direction from Brussels, British forces were discovered in the vicinity of Mons on August 22 but it was thought they were only outposts. As a matter of fact, however, the British army had come in position that day between the Scheldt and Sambre Rivers along the Condé-Mons canal. On the 23d, therefore, two of the German corps unexpectedly ran on the British main position and the battle of Mons began about noon. The British resisted stubbornly but were obliged to yield the canal near Mons and fall back to another position. That evening a third German corps appeared in their front.

Not wishing to be outflanked, that night the British commander, French, ordered his army to retire next day to a line running west from Maubeuge. On the 24th the Germans hoped for a decisive victory but the British successfully withdrew their army.

Joffre's Second Plan. On the night of August 24, Joffre realized that he had met defeat in the battles on the frontier and that he must retreat in order to save his armies of the left and centre. The British army was in danger of being outflanked and a dangerous gap was being opened between the V and IV armies due to the withdrawal of the V from the Meuse.

To renew the offensive a new army was needed on his left and this he proposed to form on the Somme River between Amiens and Péronne from troops drawn from the east. It was to be under the command of Manoury, who was to bring two of his divisions with him; the other troops were to be taken from the VII and III armies. The immediate problem was to delay the advance of the I German army until this new VI army could be formed. West of the British he had formed the VIII army—D'Amade—of four Territorial divisions of little value and to this army he now sent two reserve divisions from Paris. The British V, IV, and III armies were directed to fall back slowly to the line Péronne-Verdun. The 1st cavalry corps was detached from the V army and ordered to cover the left flank of the British army.

On the 25th, the British continued their retreat but due to the topographical features of the country the two corps were compelled to follow divergent lines and that night were widely separated. As the French cavalry had not yet reached his left, the British commander ordered both corps to continue the retreat the next day. The 1st corps—Haig—did so but the commander of the 2d corps—Smith Dorrien—decided to rest his corps as his rear guard reached camp late at night. He now had three divisions, as a fifth division of the Expeditionary Force joined him that day. As the I German army was pursuing rapidly there resulted the battle of Le Cateau. The British held their own for some time but as the German force was constantly increasing the British were ordered to retreat in the afternoon. To break off the engagement was a difficult operation attended with considerable loss and the British retreated in great confusion, but the Germans did not pursue as they too were worn out and their cavalry corps was held in check by the French cavalry corps that gained the flank of the British that afternoon. The British army next day continued its retreat until it crossed the Oise between La Fère and Noyon, where it was reorganized.

At this time German Headquarters at Coblenz made certain decisions that had a disastrous effect on the German operations on the Western front. Influenced probably by the optimistic reports of its army commanders in the west, it decided to send two corps from the west to East Prussia. As the two corps engaged in the investment of Namur, which was occupied on August 25, had not yet rejoined their armies, they were ordered to withdraw and entrain. A corps from the V army was also ordered back to Metz to be ready. As two corps had been left by the I army to observe the Belgians, the original invading force of 27 corps was reduced to 22. Of these 22, on August 27 the II army had to detach one and one-half corps to besiege Maubeuge, where the French had left a garrison of some 35,000 troops and the III army had to leave a division to invest Givet. Of these besieging troops only a half division rejoined before the battle of the Marne. A second decision was to give the commander of the I German army, who had been under the orders of the commander of the II army, an

independent command. On the morning after the battle of Le Cateau, therefore, the I army broke away from the II army and started in the direction of Péronne. By this move it prevented Joffre from forming his new VI army on the Somme but it prevented the I army from participating in force in a battle a few days later.

When the I army moved off it left the II army, now reduced to seven divisions and the 1st cavalry corps, to continue the pursuit of the V French and British armies although the V French army alone had 12 divisions. The retreat of the British army had been contrary to Joffre's plan and he now decided to make a counterattack with the V army to gain time and allow the British to recover. On the 27th, the V French army crossed the Oise and was ordered to halt and prepare for battle. The battle of St. Quentin-Guise was fought on the 29th and morning of the 30th. Although a drawn battle, the German II army barely escaped defeat and suffered severe losses. The German commander was obliged to call a division from his investing force at Maubeuge and for assistance from the nearest corps of the I army.

Meeting with no great resistance in his march to the Somme, von Kluck began to doubt the wisdom of his movement when on August 28 he received a new order from Headquarters. Joffre's retreat had deceived the German Headquarters and it was believed that the French left and centre had met with decisive defeat and were retreating on Paris The II army was therefore directed to move on Paris and the I toward the Seine west of Paris. Von Kluck, therefore, continued for two days more in that direction, meeting detachments of the new French army which avoided serious engagements but retired before him On the 29th he learned of the battle of St Quentin-Guise and on the 30th was informed that the French had retired and to gain decisive results it was desirable that the I army should act on their flank as the II needed a day's rest. Von Kluck now started to move in a southeasterly direction and informed German Headquarters, which gave its approval. He crossed the Oise and found the British still north of the Marne. He made preparations to attack them but they escaped across the river. Next he found that the V French army was just reaching the Marne and he attempted to interfere with its crossing

At this time he had no intention of crossing the Marne but on the night of September 2 he received a message from German Headquarters to the following effect:

> Desire of Supreme Command to force French in a southeasterly direction away from Paris. I army will follow II army en échelon and will protect the flank

As he was now at least a day's march in advance of the II army which was at least a day's march in rear of the V French army, his army was the only one that could act on the flank of the French but if he did so act he must disobey the order to follow the II army and also risk exposing the flank of the armies to an attack from Paris. On the following morning he learned that one of his corps had crossed the Marne at Château-Thierry and was engaged in battle. He had now to decide whether to withdraw the corps or go to its assistance. His flying corps reported the British retreating south of the Marne and no evidence of activity on the Paris front, so he decided to support his corps and crossed the Marne with four of his five corps and two of his three cavalry divisions.

Joffre's Third Plan. After the battle of St Quentin-Guise, Joffre was satisfied that his armies must retire still farther south before the offensive could be resumed. The limit was to be the Seine for the British and V French army and for the IV and III the Aube and Ornain with the flank resting on the fortified ridge east of the Meuse.

In retreating the IV French army had offered such resistance that the IV German army was compelled to call to its assistance the III German army, which prevented that army from assisting the II in the battle of St. Quentin-Guise. On the appearance of the III German army Joffre detached the left wing of the IV army and placed it under the command of Foch as the Foch Detachment; it later became the IX army In its retreat the front of the III army was shortened, which enabled Joffre to order one of its corps to Paris and a division to Foch Joffre also withdrew some of the cavalry divisions with the I and II armies and formed the 2d cavalry corps—de Mitry—between the V and British armies. The V army retreated to the Seine at Nogent, Foch toward the Aube, and the IV to the Ornain and the III between the Ornain and the Meuse

On the morning of September 5, von Kluck, who was still north of the Marne, received the following message from Headquarters·

> I and II armies will remain opposite the east front of Paris, the I army between the Oise and Marne the II between the Marne and Seine.

At that time four of his corps were on the south side of the Marne and would reach the Grand Morin between Coulommiers and Esternay that night In their front were the 1st and 2d German cavalry corps. The British and V French armies were apparently retreating along their front As there seemed to be no reason to break up the plans for the day, he decided to let the movements go on but to issue orders for the withdrawal of his army to the north side of the Marne the next day In the evening a staff officer from Headquarters came to see him and explained the general situation The III, IV, and V German armies were making slow progress southward and the I and II armies were to remain stationary until these armies advanced far enough to threaten the rear of the I and II French armies, cause them to retreat and thus permit the VI and VII German armies to advance. That night neither von Kluck, who had crossed the Marne that day, nor the German Headquarters had the slightest suspicion of a French counterattack, although it had already begun north of the Marne.

When the French armies began their retreat to the Marne, Galliéni was made military governor of Paris and the VI army was finally organized east of Paris. Galliéni kept himself informed of the movement of the I German army and communicated his knowledge to Joffre at his headquarters at Bar-sur-Aube, where the movements of the armies were carefully plotted. At 6 P.M. on the 4th of September it was known that von Kluck had crossed the Marne and reached the Petit Morin with three of his corps and that only one with a cavalry division was left in front of Paris. If he continued the advance on the morrow he would reach the Grand

Morin and his front would be stretched to nearly 50 miles. At last a favorable opportunity for a counterstroke had arrived. On the night of the 4th and morning of the 5th all the armies received their orders. They were briefly that the VI and British armies on either side of the Seine were to attack von Kluck's army from the west while the V army attacked it from the south. The IX army was to hold the II German army in check and protect the flank of the V army The IV and III armies were to attack the IV and V German armies, the III striking their flank. September 5 was to be spent in preparation and the attack was to be on the morning of the 6th. With his orders Joffre issued a stirring appeal to his troops:

"At the moment the battle begins upon which the safety of the country depends each one must make up his mind no longer to gaze to the rear Every effort must be centred on attacking the enemy and forcing him back An organization that finds itself unable to advance must hold the captured ground cost what it may and allow itself to be annihilated rather than retreat. Under the circumstances no weakness can be tolerated."

The orders were received with delight by officers and men who were tired of retreating before an enemy they felt they could face.

Battle of the Marne. Although not contemplated, the battle of the Marne really began on the afternoon of September 5, when the VI French army was moving into position and two of its reserve divisions unexpectedly encountered the corps that von Kluck had left in front of Paris. The reserves were repulsed but, the German cavalry discovering other troops advancing, the German corps retired during the night and took up a more favorable position some miles in the rear. Von Kluck was informed of this during the night but still did not anticipate a battle; however, he warned the nearest corps to go to the threatened front as soon as possible The battle of the Marne thus begun was fought continuously until the afternoon of the 9th, when the I, II and III German armies began their retreat. In front of the IV and V German armies it lasted some days longer. On the Paris front, in the battle of the Ourcq, between the VI French and I German armies, the lines swayed back and forward as new troops were thrown into the line on one side or the other. It was not until the 9th that von Kluck was able to bring up his last corps which had been fighting daily south of the Marne from the 3d to the 6th with the V French army and then had to march 50 miles to reach its place in line. It was in this battle that Galliéni used the Paris taxis to take newly arrived troops to a threatened position in the line.

The II German army found in its front the IX French army and on the right the V army. It called to its assistance a part of the III army and succeeded in forcing back the right wing of the IX army but its own right wing was forced back by the advance of the left of the V army. On the first day of the battle there was nothing in front of the British army except the 2d German cavalry corps; on the second day there was nothing in front of the left of the V French army and the 2d French cavalry corps but the 1st German cavalry corps. On the afternoon of the 8th, the advance of the V army forced the commander of the II German army to withdraw his right wing in order to rest his flank on the Marne. On the morning of the 9th, the British were seen advancing to the Marne between the two German armies and the commander of the II German army decided that the time had come to retreat in order to close the gap. This opinion he imparted to the staff officer from Headquarters who had remained with the armies. The II and III armies were authorized by the latter to begin the retreat that afternoon and he personally delivered the order to retreat to the chief of staff of the I army. Von Kluck was loath to retreat as he had just started an attack which was progressing satisfactorily but he could not continue if the II was retreating so he gave orders for the withdrawal. No decision was reached in the fight between the IV and V German armies and the III and IV French but the former were compelled to fall back when the II and III recrossed the Marne.

The battle of the Marne must be regarded as a significant defeat for the German armies as it completely shattered the plan on which the War was based. Flushed with success, having the initiative, opposed by troops supposedly dispirited by defeat after defeat during a long and exhausting retreat, the Germans found this check as unexpected as the French found it welcome. On the French side moral forces were developed, the intensity of which continued undiminished. The Germans, although not disabled, were compelled to meet an entirely unforeseen situation.

Battle of the Aisne. After the retreat from the Marne, the German armies ultimately halted and intrenched on a line which began south of Noyon on the Oise, followed the ridge north of the Aisne to the Reims-Laon road where it crossed the Argonne Forest and reached the Meuse north of Verdun On Sept. 10, 1914, Joffre issued an order for a coördinated pursuit of the retreating Germans. He believed that they planned to retire to the Meuse, but when the Aisne was reached every indication pointed to a halt on that river. The French and British crossed the Aisne west and east of Soissons respectively, but were unable to break the German line, which had been reinforced by a corps from Belgium and the besieging corps from Maubeuge which fell September 7.

First Battle of the Somme. When it became clear that the Germans could not be successfully dislodged from the Aisne, Joffre planned to outflank the Germans from the left bank of the Oise and force them to retreat from the Aisne. The greatest part of de Castelnau's II army was sent to the north of Paris to assist the left wing in carrying out this objective. The Germans, on their side, were determined to do the very thing the French were planning to do. They gathered reserve forces and, about September 20, a series of battles began around Lassigny and Roye, which were extended northward west of Péronne and ended with the left of Castelnau's army at Albert on the Ancre River. These battles lasted about 10 days, then the lines were stabilized. Bapaume, Noyon, Lassigny, Péronne and Chaulnes remained in the hands of the Germans but Castelnau succeeded in turning the continuation of the Aisne line northward instead of west along the Somme and therefore accomplished his object to some extent. The withdrawal of Castelnau's II army from Lorraine permitted the Germans to advance across the Moselle and capture the St. Mihiel salient, which they held

until they were dislodged by the Americans in 1918.

Battle of Arras. Castelnau's failure to outflank the Germans determined Joffre to make one more effort. This time he planned an advance through the valley of the Scarpe on either side of Arras in the direction of Douai. A new X army under General Maud'huy was organized for this purpose. General Foch was given the command of the group of French armies between the Oise and the English Channel. In the first week of October, Maud'huy's army advanced from Amiens and reached Arras, but found the Germans in front of it. He was unable to advance past this city. The French line was extended northward to the west of Lens, to the Lys River northwest of Lille. The Germans also extended their lines northward and occupied Lens and Lille. The lines became stabilized here and the second attempt to outflank the Germans failed.

British Operations South of the Lys River. In the latter part of September and early October, the British army was carefully removed from the vicinity of Soissons and railed up to the neighborhood of the English Channel where it would be closer to its base of supplies. After receiving reinforcements, including an Indian corps, the British, on Oct. 13, 1914, began to advance south of the Lys River. The advance stopped at Auber ridge about midway between Béthune and Lille. Another British corps advanced north of the Lys River and drove the German cavalry across the river. The British advanced as far as Armentières. The right was unable to advance on Lille and the left was unable to cross the Lys. Although severe fighting occurred in this region until the close of active operations for the year the lines were virtually stabilized by the 20th of October.

Battle of Flanders. The failure of the Allies to outflank the Germans was followed by an attempt on the part of the Germans to again outflank the Allies, and to secure if possible the Channel ports of Dunkirk and Calais. As a preliminary operation, it was decided to capture Antwerp. The siege began September 28; at first the Allies decided to attempt to hold it and British naval brigades were sent to reinforce the garrison; it was to be further reinforced by other British and French troops. In a few days, however, it became evident that it could not be held and preparations were made to withdraw the Belgian army to the west. The fortress fell on October 10 but the Belgian army retired in safety, its retreat being covered by a British division sent to Ghent from England. After the fall of Antwerp, German reserves were rushed to the Belgian front and established themselves on the Ostend-Courtrai line. The battle of Flanders was fought over such a long front that it really consisted of several detached battles rather than one large one. These several battles have been called the battle of the Yser, Dixmude, North of Ypres and South of Ypres.

The Battle of the Yser was largely fought by the Belgians. It started on the 18th of October when the 3d German reserve corps advanced to cross the river. The Belgians were strongly intrenched on the east bank of the river and their front was flanked by British monitors. The Germans did not reach the river until the 20th. On the night of the 21st, the Germans succeeded in bridging the river and by the 25th had two divisions across the river. The Belgians retired two miles to a railroad embankment where they were reinforced by a French division. On the 30th the Germans captured Ramscappelle on the railroad but were soon forced to withdraw when the Belgians flooded the terrain between the railroad and the river.

Dixmude was attacked by the Germans on the 20th of October but the attack was repulsed. On November 10, after a fierce bombardment of artillery and trench mortars the Germans finally captured the town. Its capture was of little importance, however, since the battle of Flanders was practically over.

North of Ypres, on October 19, the Germans fought their way across the Thourout-Roulers road checked by French cavalry until the main line held by French infantry was reached. Heavy fighting ensued up to November 10 but the Germans were unable to make any appreciable gain.

South of Ypres, the Germans advanced steadily but slowly until the 24th, when they were checked by the British. The attack was renewed on October 30 and November 1. These were critical days for the British army. It was attacked in force between the Menin road and the Lys River. The Messines and Wytschaete ridge was the objective of the German attacks. Messines was taken on October 31 and Wytschaete on November 1. The Germans felt that they had broken through the Allied lines. Strong French reinforcements were hastily brought up, however, and the final German attack on November 10 and 11 was repulsed all along the line with the exception of Dixmude, which fell into German hands. Minor operations continued until November 20, when the lines were consolidated for the winter. The battle of Flanders was now over and was the third serious check for the Germans on the Western front in 1914, the other two being the battles of Lorraine and the Marne.

Beginning of Trench Warfare. The conclusion of the battles of Flanders, Nov. 11, 1914, marks the beginning of what we may call the long siege of the armies over the whole line from the sea to the Swiss frontier. It was a time of ceaseless watching, of hardship and trial, of continuous fighting with neither side able to advance at the expense of the other. Local advantages gained first by one and then by the other adversary in no way affected the issue and indeed, as measured by the ground gained, would not be represented on an ordinary map. A word is perhaps not out of place in respect to the nature of the contest that now became the rule over the entire Western front. Trench warfare took the place of what now may be called old-fashioned operations in the open. Mining and countermining became the rule: the lines in reality were areas of parrallel trenches protected by networks of barbed wire so thickly interlaid and interwoven that only long sustained artillery fire could break them down in clearing the way for assault. The troops lived in and under the ground so that shrapnel, the ideal man-killing projectile against troops in the open, proved nearly useless and was replaced by the high-explosive shell, able to pierce overhead shelter and overwhelm the occupants. Operations degenerated into a struggle of wear and tear, attrition. So close did the lines draw to each other that antiquated methods

and weapons sprang into new life; hand grenades, knives, and even clubs, for close work. French mortars came into existence. Asphyxiating gases, in violation of The Hague Convention, were used. Artillery took a position of first importance, as was but natural in a state of siege warfare. The reason of this state of affairs is to be found, in part at least, in the air service, which made surprise well-nigh impossible and allowed time for the threatened side to make ample preparations to resist any impending movement, and which also increased the efficiency of artillery by enabling batteries to correct their fire, and by discovering and assigning targets invisible from the batteries themselves.

Operation of 1915. The year of 1915 on the Western front was spent by the Allies in testing the German line at various points, in an endeavor to break through and prevent German troops from being withdrawn from the Western front to reinforce the armies operating against Russia. The Germans remained on the defensive, making but a single attack.

The British attacked by two corps at Neuve Chapelle with a view of reaching the town of Lille. This attack was made in the month of March but resulted only in taking the German advance line with heavy loss to the attacking troops. This was followed in April by the German attack on Ypres, where clouds of chlorine gas were first employed. It was only a partial success as the Germans were unable to reach Ypres, which was held by the British. The attack thus initiated lasted a month but without further German success.

In May, there occurred a combined attack by the British and French along the front between Neuve Chapelle and Arras. The British attack was made by three corps at Festubert and resulted in an advance of 600 yards over a front of four miles. The French attack was made by seven corps on a 10-mile front north of Arras; at one point the French troops advanced two and a half miles but a break-through was not secured. The struggle on this front continued on through June. These attacks occurred shortly after the Germans began their great advance against Russia

In September, there were simultaneous attacks by the French and British on widely separated fronts. In the north the British attacked with three corps in combination with the French on the front where the French had attacked in May. The British objective was the mining town of Lens. The British almost attained their objective but were unable to hold it; they secured the neighboring town of Loos. The French on their right attacked with about seven corps, their objective being the ridge overlooking Lens, the Vimy ridge. They were, however, held up in the valley in front and succeeded only in taking the town of Souchez.

The great French attack in September, however, was made on a front of 15 miles in Champagne between Reims and the Argonne Forest. Here two armies were employed and the attack was preceded by a three days' bombardment by as heavy a force of artillery as the French could assemble. Under this fire the intricate system of trenches and wire entanglements became a perfect labyrinth through which it was impossible to advance in good order. As a result, the French were held up at the German second line some miles in rear where fresh troops had just arrived from the Russian front.

During the year, the French made various attempts to force the Germans to evacuate the St. Mihiel salient but they met with little success. Minor operations also took place in the Argonne Forest and along the Vosges front. On the whole, it may be said that the lines established at the close of 1914 remained practically unchanged during 1915

In 1915, the British forces on the Western front were greatly increased and at the close of the year the British front extended from the Belgian front north of Ypres almost down to Arras. The British were also prepared to place a third army in line early in 1916. This enabled the French to increase their reserve troops.

1916. Verdun. The offensives of 1915 were completely overshadowed by the battle of Verdun, which began in February, 1916. Von Falkenhayn, the German chief-of-staff, who succeeded von Moltke after the battle of the Marne, was greatly disturbed by the Allied offensives in September, 1915, which came so close to succeeding, and determined to forestall another Allied offensive by a German effort on a grand scale. After careful consideration Verdun was decided upon as the place of operations. For dynastic and political reasons the command of the attacking forces was given to the German Crown Prince.

Verdun was an entirely different place from the Verdun of the beginning of the War. Having profited by the fate of Liége and Namur, the forts at Verdun were held by light garrisons only and the French line was established about 10 miles to the north and east Intermediate lines and positions covered the area between the fortress and the outer line of defense. The Verdun position was a salient about 45 miles wide across the neck which extended from St. Mihiel to the Argonne. Most of the salient was on the eastern side of the Meuse. Along the east bank of the Meuse there is a ridge—Côte de Meuse—five miles wide and about 400 feet high To the east of the ridge and extending to the south is the plain of the Woevre, which in the spring is too soft for any operations. The French line crossed the ridge from the Meuse River and extended about five miles into the plain of the Woevre The two trunk lines, which supplied Verdun before the War, Paris-Verdun and Paris-Verdun via Commercy, were under the observation and fire of the Germans in the Argonne and at St. Mihiel. A single-track narrow-gauge road from Bar-le-Duc via Souilly was the only railway means of supplying troops to Verdun.

The Crown Prince planned his main attack along the ridge from the north. If this were successful, the French would be obliged to evacuate their line in the Woevre to prevent capture and a secondary attack could be made along that point. Von Falkenhayn believed that an attack on Verdun would succeed because its inferior rail communications and the limited number of bridges across the Meuse would interfere with its reinforcement. The operation, which he estimated would take eight days, was to have its right flank protected by a later advance on the west side of the Meuse, which would protect operations on the east from French artillery on the west bank. The German Crown Prince had at his disposal nearly one-half million men, many of whom were completely rest-

ed and others of whom were picked "shock" troops. Besides these, many other divisions were held in reserve along other parts of the Western front in readiness for immediate transportation. Tremendous amounts of heavy artillery were concentrated with an unlimited ammunition allowance. Every request for labor and equipment was complied with.

The artillery preparation for the attack was begun at 7 A.M. on Feb. 21, 1916. It continued until 4 P.M., when the infantry moved out on a front of about 4 miles southward along the ridge. During the first period of the battle (February 22–March 4), the Germans, in a slow advance, covered by extremely heavy artillery fire, captured the 1st, 2nd and 3rd positions east of the Meuse and Fort Douaumont, the most advanced of the Verdun forts, five miles from the city. Joffre immediately sent troops of the II army then in reserve, and selected its commander Pétain to command at Verdun. These were to be followed by the X army from the Arras section when they were to be replaced by the IV British army.

General Pétain arrived at Verdun on February 26, and ordered a counterattack at once along the entire line. He divided the front into corps zones and assigned the artillery, which was arriving in great numbers, to the zones. The occupied ground was to be organized and held, and the forts to be reoccupied and rearmed. The number of bridges between Verdun and St. Mihiel was to be increased from 7 to 41. Pétain also organized a truck line of communication from Bar-le-Duc to Verdun, over which 3000 auto trucks passed every day. This saved the supply situation, and the French call the road "the Sacred Way." On March 4 the French were holding their fourth position, a series of ridges between Douaumont and Verdun.

During the second period of the battle (March 5–22) the Germans were unsuccessful in their attempts to advance their right wing west of the Meuse to Hill 304 and Dead Man's Hill, and their left wing from the Woevre plains, which had been evacuated by the French who established a new line on the east crest of the ridge around Fort Vaux. During the third period (March 22–April 30), the German Crown Prince suffered such losses that, by March 22, fresh troops were required. On April 9–10 he ordered a general attack along the whole line and captured the crest of Dead Man's Hill. This was recaptured by the French on April 20. Many local battles were fought during this period. During the fourth period (May and June) General Nivelle, who on May 2, had succeeded General Pétain in command of the Second Army and of the defense of Verdun when the latter was promoted to command an army group, carried out Pétain's policy of counterattacking on every possible occasion. The violence of the German attacks and the stubbornness of the French defense may be judged by the fact that although the Germans attacked Hill 304 from May 4 to 7, with more than 100 batteries of heavy artillery, they captured only the north part of the hill. Douaumont was recaptured by the French on May 22–23. On the latter date, the Crown Prince captured Dead Man's Hill and retook Douaumont. In June, he concentrated on the attempt to capture Forts Vaux and Souville. Fort Vaux was completely destroyed in the first week of June, and the struggle for Souville, which was really the key to Verdun, became most desperate. Joffre forbade any retreat. The crisis of the attack came on June 22 and 23 when, after an unparalleled bombardment, the Germans reached the edge of Souville On the next day Nivelle began counterattacks on a grand scale and by June 30 had driven the Germans beyond Fleury a mile to north. The next day, Joffre and Haig launched the battle of the Somme, with such force that von Falkenhayn was forced to withdraw troops from Verdun for the Somme, and to abandon the idea of an immediate capture of Verdun.

The struggle now became a deadlock. This continued until the latter part of October, when the French regained in three hours what it had taken the Germans months of effort to attain. This and subsequent actions are usually referred to as the Second Battle of Verdun. This three-hour action was the most brilliant action of the whole Verdun campaign. General Nivelle's artillery preparations were brief but of exceedingly great intensity; then came the infantry attack on October 24. The Germans were driven back and what remained of the forts Douaumont and Vaux was again in the possession of the French. During the next six weeks there were scarcely any infantry engagements and the artillery actions that occurred were of minor importance. On December 15, however, despite wintry conditions, Nivelle executed another great coup. He attacked on a front of six miles after a three-day artillery preparation. He succeeded in penetrating the German front for a distance of nearly two miles. The immediate general in command was Mangin.

After this advance the Verdun front once again became quiet, each adversary watching the other and being content to remain on the defensive. After 10 months of heavy fighting the Verdun struggle was virtually over. The total loss, including prisoners, dead, sick and wounded, was exceedingly great on both sides. In the last analysis, it was a great French victory. The moral effects on the French troops and French nation can scarcely be overestimated. The Verdun slogan "They shall not pass" was taken up as a battle cry all along the front and behind the lines. As a reward for his heroic work at Verdun, General Nivelle was made commander-in-chief of all the French armies, succeeding General Joffre.

First Battle of the Somme (Picardy). In his reports on this battle, Haig made the following statements:

"The principle of an offensive compaign during the summer of 1916 had already been decided by the Allies. The various possible alternatives on the Western front had been studied and discussed by General Joffre and myself and we were in complete agreement as to the front to be attacked by the combined French and British armies. Preparations for one offensive had made considerable progress; but as the date at which the attack should begin was dependent upon many doubtful factors, final decision on that point was deferred until the general situation should become clearer

"Subject to the necessity of commencing operations becore the summer was too far advanced, and with due regard to the general situation, I desired to postpone an attack as long as possible. The British armies were growing in numbers and the supply of ammunition was steadily increasing.

"By the end of May the pressure of the enemy on the Italian front had assumed such proportions that the Russian campaign was opened early in June, and the brilliant successes gained by our allies against the Austrians at once caused a movement of German troops from the Western to the Eastern front. This, however, did not lessen the pressure on Verdun. The heroic defense of our French allies had already gained many weeks of inestimable value and had caused the

enemy heavy losses; but the strain continued to increase. In view, therefore, of the situation in the various theatres of war, it was eventually agreed between General Joffre and myself that the combined offensive should not be postponed beyond the end of June"

The Allies proposed to attack on a front of about 30 miles in an air line in order if possible to effect a break through the German lines; this front was about equally divided between the British and French. The VI French army—Fayolle—was astride the Somme with the X French army—Micheler—on its right. Directly in front of the French armies, and five miles away, lay their objective, the town of Péronne on the east bank of the Somme The ground in their front was generally level The IV British army—Rawlinson—was on the left of the French, facing a ridge which rose between the Albert-Péronne and the Péronne-Bapaume roads. On the slope of this ridge, facing the British, the Germans had organized the position consisting of two strong lines about two miles apart; between the two lines were woods, villages, etc., strongly organized for defense. A third and even a fourth line had been begun still farther to the rear The entire front was held by the II German army but after the attack began it was subdivided into two sectors, the I German army being organized in one of them.

The artillery preparation for the great attack began June 24 and continued for an entire week; the infantry attack was launched July 1. In the opening attack the greatest advance was made by the VI French army which broke through the German first and second lines and at one point advanced three miles by July 5; the British during the same period advanced their whole front about half this distance. Fresh troops were now brought up to reduce the centres of resistance between the two lines on the British front and by the middle of July on both fronts the Allies were ready for a second grand attack by which the VI French army advanced to the Somme River opposite Péronne but was unable to force the crossing; the British on their front broke through the German second line. It was now decided not to attempt any further advance of the VI French army south of the Somme but to move its reserves to the north of the Somme, where they were to be employed on the right of the British. From the middle of July until the middle of September, the British were engaged in the capture of the remainder of the German second line and the villages, woods and other strong points between it and the third line. About the middle of September, after a three days' artillery preparation, the German third line was taken. In this attack the British heavy tank was employed for the first time and met with considerable success. A fourth attack made about the end of September carried the last of the German prepared lines and the entire ridge was in the possession of the Allies. After September the attack died down somewhat but resulted in the straightening of the British front About the middle of November, the weather conditions made further operations impossible.

According to Haig, who had been in command of the British army in France since the beginning of 1916, the British employed in this attack 45 of their 70 divisions on this front and the Germans reinforced their original 6 divisions by 30 more during the operations The Germans had been driven back over the entire front of 30 miles and on the British front to a depth of about seven miles. Although a break-through had not been secured, it was felt that the morale of the German army had received a severe blow by their failure at Verdun and the advance of the Allies on a front that had been made especially strong. Although the losses incurred in the great attacks on the Western front had been very heavy in all three armies, it was felt that the Germans would feel the losses much more than the Allies.

1917. Retreat of the Germans. After the close of operations on the Western front in 1916, the Allies were quite confident that the War would be ended in 1917. They were now greatly superior to the Germans in artillery, aircraft, and men. In a conference between Joffre and Haig, it was decided to forestall the Germans in 1917 and begin operations as early as possible. To prevent the Germans from shifting their reserves as they had previously done when an attack was delivered on a comparatively narrow front, it was now proposed to attack simultaneously along the entire front from Lens on the north to the Oise River on the south, in combination with a secondary attack by the French between Soissons and Reims. In December, however, Nivelle succeeded Joffre, and he made a new plan which Haig was directed by his government to support. According to this plan the French were to make the main attack between Soissons and Reims, and, to aid in this attack, the VI and X French armies on the Péronne front were to be replaced by British troops The British, however, were to attack as previously arranged. The change of plan delayed the opening of the attack and enabled the Germans to secure the initiative.

In August, 1916, Falkenhayn was relieved as chief of staff of the German armies by Hindenburg, whose chief assistant was Ludendorff. In the winter of 1916–17, they decided that the Western front was too long for the available troops and decided to evacuate the Roy salient and fall back on a chord of this salient running from Arras on the north to the vicinity of Soissons on the south The new line was carefully selected and fortified during the winter; it was called the Siegfried line but was known to the Allies as the Hindenburg line The withdrawal of the stores began early in February and in the middle of March the troops began their retreat. To prevent the Allies from making an early attack on the new front, as the troops retired roads were blown up, and everything that could be of use or protection to the troops of the Allies was carefully destroyed

As a result of this unexpected movement, the plan of the Allies had to be changed, as the new line was in places 25 miles in the rear of the old one. Before any serious attack could be made on the new line it was necessary to construct railways, repair roads, organize munition dumps, etc., all of which would take considerable time. The Allied attacks could no longer be made as planned over the entire front from Lens to Reims but had to be confined to the parts of the old German front that had not been evacuated. It was decided, therefore, to make an attack as soon as possible with the III British army assisted by the I British army on the German line in the vicinity of Arras, while the IV and new V British army organized

their position before the new German line farther south. Nivelle was to make his great attack as planned between Soissons and Reims but it was to be extended to the east of Reims. The British and French armies on the front of the Hindenburg line were to coöperate as well as they could, simply to prevent reserves being sent to the fronts to be attacked.

Battle of Arras. One of the reasons for the German withdrawal was to nullify any preparations the Allies had made for a spring offensive This object failed of realization when scarcely a week later the British began an offensive on a 12-mile front north and south of Arras (April 9). Haig made long and minute preparations for the offensive. A continued aërial offensive gave him the control of the air. He also carried out a three-week wire-cutting artillery fire, interdicted the back areas, and for a few days preceding the attack laid down a terrific destructive fire, accompanied by extensive gas discharges; 4000 cannon were used in this preliminary work. Tanks were assigned to each corps to lead in the assaults. It was prescribed that halts for reorganization would occur only after the capture of each successive position.

On April 9 the British attacked on a 20-mile front. The I army under Horne advanced north of the Scarpe and the III army under Allenby advanced south of the Scarpe. On that day the Canadians stormed Vimy Ridge. The entire first line positions were captured in 40 minutes. The second positions were captured by noon. The third position presented greater obstacles, largely because the wire had not been effectively cut by the artillery. A gap had been made in the German lines but Haig failed to exploit his success and the probability of cutting the enemy's lines of communication was lost. Instead of sending the cavalry through the gap, Haig ordered the gap widened. This hesitation enabled the Germans to bring up the sorely needed reserves and prevented a serious break-through. The British were greatly hampered in their operations which began in a snow storm; this was followed by rain which made the movement of artillery extremely difficult. After the opening attack which ended April 13 the attacking divisions were replaced and the operations were renewed but the original momentum was lost. The attack, however, went on until May 4, in order to prevent reserves from being sent to the French front when Nivelle's attack was going on. By May 5, Haig had advanced five miles on a front of 20 miles and siege conditions again obtained. The Germans had lost 15,000 prisoners and 200 guns. The result was to give the British the Vimy Ridge and its extension southward, which proved of great value when the Germans made their great attack the following year. Checked on this front, the British suddenly shifted their operations to the Ypres sectors.

French Offensive on the Aisne. After the retreat of the Germans to the Hindenburg line, General Nivelle had concentrated a force of 1,200,000 men (V, VI, X and IV armies) and 5000 guns in the Aisne area between the Oise and the Argonne. With this force he planned to attack the German front on a grand scale. The German front ran due south from the Ailette River to the Aisne at the junction of the Vesle and thence along the south bank for a few miles where the Germans had a bridgehead captured in the winter of 1914–15; thence the line crossed the river to the Chemin des Dames Ridge (Ladies' Way, so called because it was built by Louis XV as a promenade for his daughters), between the Ailette and Aisne Rivers and along that ridge to Craonne. From Craonne the line ran southeast to some heights commanding Reims and thence over the Moronvillers ridge between the Suippe and Vesle Rivers to the Suippe. The attack was to be prepared by a long artillery bombardment.

The artillery began its operations on April 9, but the weather conditions were so bad that the infantry attack had to be postponed from the 12th to the 16th. Even then the weather conditions were unfavorable. Besides this, Hindenburg was fully cognizant of the French plans through the medium of captured despatches and had taken adequate means to fend off the French attack He also withdrew the I army from the Hindenburg line and sent it to the French front. As a result, although the German lines were penetrated at various points along the front, only the first of the German lines could be captured and held on the Chemin des Dames Ridge and to the east. At the close of the first day it was evident that there was to be no break-through. Despite this Nivelle kept up attack until the 21st. In an intermittent battle lasting from April 17 until May 20, the French IV army east of Reims—Anthoine—succeeded in capturing the high ground of Moronvillers. On the night of May 4 the French captured Craonne, a key point on the Chemin des Dames, and by the next day captured the crest of the Chemin des Dames to the west and, to the east, the plateau of Craonne.

The French troops, after the initial defeat of April 16, considered success on the Aisne impossible. Units up to divisions in size, although asserting themselves to be loyal and ready, if necessary, to die for France, refused to continue the attack on the Aisne, on the ground that it was a useless loss of life. Although 20,000 prisoners and a large number of guns had been taken the French casualties amounted to about 120,000 and its general advance west of Reims had been slight. General Nivelle lost the confidence of his government by this gigantic failure and on May 15, Pétain succeeded him in command of the French armies, and Foch, who had been without any important duty since the preceding December became chief of staff at the War Department. Foch had been in command of the northern group of French armies since 1914 but this group was broken up when the VI and X armies were moved to the Aisne front.

British Operations in Flanders. The U-boat campaign had become exceedingly effective and as the principal base of these operations was Zeebrugge, the Channel port of Bruges, the capture of this port became a very important objective. Haig believed that this could be accomplished by land operations from the British front in Flanders operating from the Ypres front in the direction of Bruges. In June, 1917, when operations were begun on this front, the IV German army held most of the front from the Channel to the Lys River. In the north, its line was the east bank of the Yser River except on the coast where the Allies had a bridge-head on the east bank. From the Yser it followed the Ypres Canal almost to that town, which was held by the British. South of Ypres it held the Messines Ridge, which had been captured from the British in

1914. To strengthen its lines it had constructed a large number of concrete machine-gun emplacements called by the British "pill boxes."

Haig was given the I French army—Anthoine—to assist in his campaign and brought up the headquarters staffs of the IV and V British armies whose fronts were taken over by the III army. A new IV army was to operate along the coast and a new V army was to operate with the II army already on this front. While preparations were made to attack north and east of Ypres he directed the II army to capture the Messines Ridge.

This attack opened on June 7, 1917, when there occurred one of the most spectacular events of the entire war. This was the blowing up of the Messines-Wytschaete Ridge. This ridge formed a salient which dominated the entire Ypres sector from the south and which was literally a thorn in the side of the Allies. For over two years British sappers had been burrowing under this ridge and finally succeeded in placing in position, undetected by the Germans, 20 mines containing more than 1,000,000 pounds of ammonite. These were exploded by electricity on the morning of June 7. The whole tops of the hills were blown off and the roar could be heard for a distance of 150 miles. A tremendous shell fire which had been playing on the ridge for two weeks reached its greatest intensity as the mines were exploded. After the explosion the British infantry rushed forward and by the end of the day had wiped out the entire salient. The Germans retaliated for this Allied offensive by a successful attack on the British line at its most northern extremity in Belgium. On July 11, after heavy artillery preparation, the Germans made a strong infantry attack on the British positions east of the Yser River and captured the entire works. The preparations on the front of the main attack were made during the month of July but as the Germans had captured the bridgehead near the Channel the attack was confined to the front from Dixmude to the Lys River. In this opening attack the I French and the V and II British armies were to be employed. After a prolonged artillery preparation the infantry attack was to be launched on July 31 and the Allied forces advanced about two miles, capturing the first and second German lines. A heavy rain now set in which lasted several days and made further operations impossible. The field of operations being generally flat, it was converted into an immense swamp over which movement was possible only on the few roads.

Some minor operations were undertaken about the middle of August by the V army that met with so little success that the commander of that army was relieved and the British front placed under the orders of the commander of the II army—Plumer. In the latter part of September the ground was again sufficiently dry to admit of another general advance and on September 20 the Allies again advanced about a mile. Then followed a succession of attacks with limited objectives carried on under very unfavorable weather conditions. The Allied objective was no longer the Belgian coast but only a ridge about five miles east of their original position; this ridge overlooked the ground to the east and in the possession of the Allies would make future offensive operations on this front practically impossible to the Germans. Most of this ridge was secured early in November when the Canadians captured Passchendaele. This closed the operations.

According to Haig, in these operations the British employed two-thirds of their divisions in France one or more times and the Germans 78 divisions, 18 of which were employed a second and a third time after being withdrawn to rest and refit. The casualties on both sides were extremely heavy. As a strategic movement it was not a success but it did produce a great effect on the morale of the German army.

Verdun Again. On Aug. 20, 1917, after nine months of comparative quiet, the French resumed the offensive at Verdun. After a three-day bombardment they advanced on both sides of the Meuse and penetrated a mile and a quarter on an 11-mile front. In the next four days smashing blows were delivered which resulted in a further advance. By the 15th of September the French had recovered 100 square miles of the 120 the Germans had seized in their great offensive. They now held all the dominating positions in the Verdun sector and on the west of the Meuse the Germans were back in the lines from which they advanced in 1916.

Second Battle of the Aisne. On Oct 23, the French X army—Maistre—launched a successful attack in the Aisne region. The attack was directed at the salient of the German line northeast of Soissons and just south of the Ailette River. The objectives were reached that day and immediately organized. The result of this attack was the abandonment by the Germans of the Chemin des Dames by November 2, and the retirement across the Ailette. This operation which was based on surprise, captured with comparative ease what Nivelle failed to capture with nearly a million and a half men. It worked marvels in the restoration of confidence and the rehabilitation of the French soldiers' morale.

Battle of Cambrai. While the British operations in Flanders were in progress, the commander of the III British army—Byng—had been preparing plans for an attack on new lines. The battle was to be a complete surprise without artillery preparation, a method untried up to this time in the War. The attack was to be led by a lone line of tanks followed by the infantry. Special preparations had been made to enable these tanks to cross the German trenches of the Hindenburg line which were here 15 feet wide and 9 feet deep. After the close of the operations in Flanders, Haig gave his consent to the attack but was unable to send enough divisions to hold the ground won by its unexpected success.

The attack was to be delivered on a front of about 6 miles between the Canal du Nord and the St. Quentin Canal southwest of Cambrai. A strong cavalry force was assembled in rear to be employed if a break-through was secured. On the morning of November 20, preceded by a barrage, 350 fighting tanks moved off followed by the infantry. The main and reserve lines of the German position were taken and on the second day the British were five miles in advance of their own lines fighting for a ridge which in their possession would have commanded Cambrai. Their force was too small to effect its capture and although other divisions were hurried up it was then too late. The cavalry was disappointed as the bridge

over which they expected to cross the St. Quentin Canal was broken down and the arrival of a German division from Russia closed this front. While the fighting was still going on in the captured area, the Germans hurried up reserves and on November 30 made a counter-attack across the St. Quentin Canal and recovered about half the area they had lost.

The battle of Cambrai established the value of tanks, and preparations were made both by the British and French to employ them on a grand scale in 1918.

Allied Unity. The prime ministers of France, Italy and Great Britain met at Rapallo, Italy, on November 9, and formed the Supreme War Council, which was to coördinate the military powers of the Allies and wage war as a unified group and not as individuals. The members of the Supreme War Staff were to be Generals Cadorna (Italy), Foch (France), and Wilson (British). According to the agreement, "The Supreme War Council has for its mission to watch over the general conduct of the War. It prepares recommendations for the considerations of the governments and keeps itself informed of the execution and reports thereon to the respective governments." General Bliss later became the American representative.

American Expeditionary Force. The first contingents of a United States army to fight in Europe arrived at a French port on June 26 and 27, 1917. They were commanded by Maj.-Gen. William L. Sibert and received a tremendous ovation from the French people. On the way over, the transports had been unsuccessfully attacked twice by submarines. Gen. John J. Pershing, the commander-in-chief of the American force, had been in France for some time preparing for the coming of the "Sammies," as the French characterized the American soldiers. Training camps for the American troops had been located in various parts of France and were ready for occupancy when the soldiers arrived. Infantry, artillery, aviation and medical bases were established. The number of men gradually increased, many of them stopping in England before going over to France. An intensive system of training was entered upon during the latter part of July. American officers were aided by officers and men of the British and French armies. The American transportation service took over transportation on all railways leading to American bases and a section of French forest was turned over to American lumbermen for the needs of the Expeditionary Force.

For the details of the actual raising, training, and equipping of the American army, see UNITED STATES and allied topics.

1918. Last Year of War on Western Front. The months of January and February, 1918, were months of comparative inactivity along the battle line from the North Sea to the Swiss border. The outstanding feature of the War at the close of 1917 was the signing of an armistice between the Central Powers on the one hand and Rumania and the de facto government of Russia on the other. The defection of Russia from the side of the Allies was the signal for a tremendous publicity campaign in Germany, predicting a gigantic blow on the Western front, which would completely crush the British and French armies before the American forces could land in sufficient numbers to give any substantial aid. The depression in Allied countries caused by the abolition of the Eastern front was somewhat overcome by Allenby's victories in Asia Minor and the unexpected rapidity with which the United States rushed men and material to Europe.

The chief cause for the optimistic tone of the Teutonic press was the fact that huge quantities of material and a large number of men could not be transferred from the Eastern front for immediate service on the Western front. The German High Command adopted a policy of careful selection of the men who were to be transported westward. As a skeleton for the new division to be formed they picked out all the soldiers in Russia between the ages of 25 and 35. They realized that it would be impossible to withdraw all the men from Russia inasmuch as the Treaty of Brest-Litovsk provided for the occupation of a considerable amount of Russian territory by German troops. While it was generally known that the personnel and morale of the Germans on the Eastern front were considerably lower than on the Western front, nevertheless the German command hoped to build up from the Eastern material about 59 or 60 divisions of 12,000 men each. This would increase the fighting strength on the Western front by about 700,000 men and would bring the highest total of available men up to approximately 2,340,000. This total would approximately equal the number of men Great Britain and France had available. American, Belgian, and Portuguese troops practically assured the Allies a numerical superiority over the whole front although not necessarily in any one sector.

On the Western front, during the first 10 weeks of the year the fighting consisted of a series of almost unending trench and aerial raids, carried out for the purpose of reconnaissance. Sometimes the trench raids would follow heavy bombardments, but generally speaking they were carried out by small patrols under cover of darkness. The Germans with varying success carried out raids in Flanders, Artois, Picardy, the Verdun sector, Champagne, and Lorraine, with the evident intention of ferreting out the weak points of the Allied line for the much heralded offensive on the Western front. The purpose of the Allied raids was to discover, if possible, the places on the German lines where any unusual concentration was being made. The aërial raids, to a large extent, were carried out over the valleys of the Rhine and Moselle Rivers, where it was known that the troops transported from the Eastern front were being refitted for service on the Western front.

The American troops, which had been pouring into France in an ever-increasing stream, and which had been gradually concentrating in camps in eastern France, were prepared to take over a section of the battle line. Pershing from the first had insisted on a distinctly American unit and had steadfastly refused to brigade the American troops with the British and French. The sector allotted to the 1st American division was about eight miles long and was on the southern side of the St. Mihiel salient, which had been established by the Germans advancing from Metz in 1914, and which had withstood several attempts on the part of the French to "pinch" it. Three French divisions were thus relieved for duty against the impending German attack. The Germans lost no time in trying out the new American forces by means

of heavy bombardments of high explosives and gas shells.

Second Battle of Picardy: The Somme Again. Shortly before 5 A. M. on Mar. 21, 1918, came the great blow which the German press and public had been so continually prophesying since the collapse of Russia and Rumania The German plan was based on sound military strategy. It was to strike the Anglo-French line where the two armies joined, break through and reach the channel ports, and thus either confine the British, Belgian and Portuguese armies in the narrow region between the Somme and the Belgian border or drive them into the sea, and then turn their attention southward to the French armies, and make a direct advance on Paris. The attack was so timed as to offset any increase to the Allied force from the United States. The success of this scheme depended entirely on a complete break-through at the junction point of the British and French armies.

The front chosen for the attack was between the Scarpe and the Oise Rivers, and was held by the III British army under General Byng and by the V British army, under General Gough. The V army section of the battle line was taken over by the British from the French at the beginning of the year. The V army was composed of about 14 divisions, roughly 170,000 men, which had to protect a line about 50 miles long. It is difficult to understand why this particular section of the line was held so lightly. This entire front was attacked by a force composed of between 40 and 50 divisions, amounting to approximately 750,000 men, about 150,000 of which were concentrated between St. Quentin and La Fère. It is scarcely to be wondered at that the V British army was brushed aside by such a superiority of men, and by the dogged determination on the part of the Germans to get through at any cost. The German armies facing the battle line were under the supreme command of the Crown Prince of Bavaria and the individual armies, XVII, II, and IX, under the leadership of Von Bülow, Von der Marwitz, and Von Hutier. The plan of attack was drawn up by the last named general.

The weather favored the Germans to a very large extent. The attack was begun a little before 5 o'clock on the morning of the 21st under the cover of such a heavy fog and mist that it was impossible to see more than 100 feet ahead. It was preceded by a brief but very intense artillery fire which was composed mainly of high explosive and gas shells. Simultaneously a heavy artillery fire broke out in the Champagne and Lorraine sectors with the obvious purpose of preventing the bringing up of reinforcements to the vital places attacked. The Germans also bombarded Paris with a long-range gun placed in the forest of St. Gobain, approximately 75 miles away. This gun killed many civilians and did much material damage in Paris, but instead of causing a panic it seemed to renew the grim determination of the Parisians to carry on.

General Gough, commander of the V British army, knew from documents taken from German prisoners that the assault was impending and had made preparation to meet it, but his preparations were practically nullified by the weather conditions. The first line of defense, i.e. the outpost line, was taken before the British were cognizant of the fact that the attack had begun. The tremendous superiority of numbers forced the resistance line (second line) very quickly and enabled the Germans to rush up to the battle line or last system of defense. Here again the inequality of numbers ultimately told and the II and IX German armies forced their way through where some of Gough's division joined. Apparently the British had made no provisions for a break-through, because there were no defense lines behind the third defense system. The road to Amiens seemed open and only heroic efforts saved it.

The battle line of the German offensive extended from southeast Arras in the direction of Cambrai, as far as La Fère The first infantry attack broke through the first and second lines of British trenches of the III army on a 16-mile front from Lagnicourt to just south of Gouzeaucourt. The result of this attack was evacuation of the British positions in the salient that remained after the battle of Cambrai at the close of 1917. On the 22nd, the Germans, after more heavy artillery preparation smashed through the entire British position along the whole front. The V British army was now completely cut off from the permanent French position before La Fère and the permanent British position at Arras. Between these two points there was a struggling mass of humanity with practically no organization as far as the Allies were concerned. It seemed certain that the German plan was to succeed and a permanent wedge inserted between the French and British armies On the 23rd the British were defeated near Monchy, St. Quentin, La Fère, and opposite Cambrai, and the British second positions between Fontaine les Croisselles and Mœuvres were penetrated. The Allies hoped to be able to hold the line of the Somme, but were unable to do so because no adequate defenses had been constructed there. On the 24th the Germans took Péronne, Chauny and Ham, and crossed the Somme River at various points south of the first mentioned place, by means of a pontoon bridge and rafts. The British were unable to completely destroy the bridge because of the haste with which they were withdrawing their artillery.

Continuing to advance on the 25th, the Germans captured Bapaume, Nesle, Etalon, Barleux, Biaches and Guiscard. On this day the French War Office announced that British lines south of St. Quentin and around Noyon had been taken over by a French army, thus showing that at last the Allies were making some successful attempts to stem the tide of invasion On the 26th, the Germans crossed the old battle line of 1916 in several places and captured Noyon, Roye and Lihon. The 26th was the decisive day of the battle of Picardy. This day saw the closing of the gap caused by the break-through of the 21st. The French came up along the Southern front from the Aisne to the Avre, and west of the Avre, where they united with the British at Moreuil. The 26th also saw the organization of a temporary force under Gen. Sandeman Carey, who had received orders to close a gap made by the Germans. With rare judgment and skill he improvised an army from sappers, laborers, engineers, in fact anybody he could find, and with this cosmopolitan force faced the Germans, fighting over unknown ground, and with officers in charge of men they had never seen before.

A few words should be said here of the

method used by the Germans to relieve men who were exhausted by constant attacking or shot to pieces by the heroic British defense. Reserve divisions were kept directly behind the battle line and when advanced divisions needed replacement, the reserves were passed through the forward divisions and the latter were rested and reformed, and then they became the reserve. By this means the Germans were able to present continually fresh men to the British, who had been fighting without rest or relief since the tremendous offensive began. Another thing to be noticed about this battle was the ease with which the Germans were able to manœuvre their attacking columns. The attack was made with three or four columns of several divisions each, and when they were stopped in one direction they were able to turn without loss of power in another direction. As most of the new ideas worked out in this battle were devised by Von Hutier, this plan of attack became known as the Von Hutier method. Many of its features were later adopted by the Allies.

The 27th saw the first perceptible signs of the slowing up of the German forward movement. The British, now reinforced, checked the Germans, and recaptured Morlancourt and Chipilly north of the Somme and advanced to Proyart south of the Somme. These gains were offset, however, by the capture of Albert and the crossing of the Ancre River north and south of that city, and forcing the French back east of Montdidier. The 28th saw the fall of Montdidier but it also saw the complete repulse of a tremendous German attack on Arras. The artillery preparation was terrific and the Germans' orders were not only to take the city but Vimy Ridge also, at all costs. The Germans used about 20 divisions in the huge effort, and after suffering appalling losses which materially reduced their numbers, were compelled to give up the attempt after an all-day battle which equaled in intensity anything that the War had produced.

The German effort had now almost spent itself and the German High Command found itself caught in a rather difficult position. The Germans had pushed a 35-mile salient towards Amiens, which was quite narrow at its extreme tip. The northern side of the salient was bounded roughly by the Ancre River and the southern side by the Avre. These water barriers were, comparatively speaking, no protection to the Allies, but the high ground on the Allied sides was an ideal spot for artillery emplacements, which commanded all the German positions in the tip of the salient. The German problem was to break through the sides of this wedge and broaden the salient or face a possible disaster. The attempt at Arras, as has been noticed above, failed During the first week of April tremendous assaults were made from Albert at the Ancre line on the north, and on the Avre line from Grivesnes to north of the Amiens-Roye road on the south Although local successes were gained by the Germans, they failed in their main purpose, i.e. breaking the lines of the Avre and Ancre and widening the salient. The chief reason for this was the time element, which had permitted the British and French to bring up men and guns and thus stabilize their lines. Another contributory cause was the fact that a heavy rain had turned the Somme battlefield into a desolate sea of mud, and hindered the Germans' transportation of men, munitions and supplies. The failure during the first week of April to smash the sides of the Amiens salient ended the battle. As to results, the main German plan was frustrated. The French and British were still united and held strong defensive positions. The Germans had taken practically all the ground they held at the beginning of the battle of the Somme in 1916, and some more besides, approximately 1500 square miles. Both sides suffered severe losses. A conservative estimate would place the German casualties at a quarter of a million men, while the Allies' were probably 50,000 less. Most of the Allies' losses were borne by the British.

Ferdinand Foch, Allied Commander-in-Chief. The terrific blow struck at the British army on the 21st of March, with the subsequent demoralization and almost complete defeat of the Allies, compelled them to take a step that up to this time they had been loath to take. That was to appoint one man as the leader of all the Allied armies. It is idle to speculate on what might have happened if this had been done previously, but many critics have stated that the great March disaster would have been avoided under a unified command. On Nov. 12, 1917, after creation of the Supreme War Council, Lloyd George said concerning it ". . . The Italian disaster necessitated action without delay to repair it. . . . It is true we sent troops to Saloniki to succor Serbia, but as always they were sent too late. Half the men who fell in that vain effort to pierce the Western front would have saved Serbia, saved the Balkans, and completed the blockade of Germany. . . . 1915 was the year of the Serbian tragedy: 1916 was the year of the Rumanian tragedy. . . . National and professional traditions, questions of prestige and susceptibilities, all conspired to render our best decisions vain. . . . The War has been prolonged by particularism. It will be shortened by solidarity" These words seem to point to a unified command but Lloyd George was compelled to go back on them because the British General Staff, which was opposed to the scheme, was too influential with the British public and Parliament. The move was characterized as an attempt to subordinate the military to the political leaders. The British felt that a French leader would not protect the British lines to the sea, and the French felt that a British leader would sacrifice Paris for the sake of defending the coast. But Allied failure on the Western front, such as at Cambrai, the collapse of Italy, and the colossal defeat just suffered by the British arms, converted the British public to Lloyd George's point of view.

From the time that the United States entered the War, President Wilson had argued unity of command as well as the pooling of all the resources of the Allies. When the Germans struck in March, General Pershing offered the small American forces in France to the Allies for use in any way they saw fit. This act on the part of the American commander finally overruled the last objections on the part of the British Staff. General Foch, whose ability, achievements, and popularity in the Allied countries, eminently fitted him for the task, was named Commander-in-Chief of all the Allied Armies. His first statement was an assurance that Amiens would not fall. In all the

countries involved he was heartily welcomed as the savior of the world by the press and the public.

Battle of Lys River. Possibly as a result of the Von Hutier idea of changing the direction of the attack or possibly as a result of the check they received before Amiens, the Germans suddenly launched an attack between the high ground north of Ypres and Arras with their IV and VI armies. The German Staff also estimated that the British armies defending these fronts were considerably weakened by the attack on Amiens. The main part of the attack was aimed between the first mentioned positions and La Bassée, astride the Lys River. A break-through of any size would seriously imperil the channel ports, inasmuch as the British had scarcely 40 miles to manœuvre in. An advance similar to that before Amiens would have resulted in the capture of Calais, one of the chief bases of supply of the British armies. The chief objectives of the first German thrust were Béthune, Bailleul and Hazebrouck. The last named place was a little over 15 miles from the starting-place, and if captured meant the fall of Ypres and the dislocation of the entire railway line behind the British and Belgian armies.

On April 9 the German armies struck at a portion of the line between Estaires and Bac St. Maur, held by a Portuguese division and smashed it completely, capturing Richebourcq-St Vaast and Laventie. This attack created a gap of about 3 miles in the British lines and through this opening German troops began to pour and spread out in ever-increasing numbers. On the 10th the Germans crossed the Lys River at several points between Estaires and Armentières, and launched a tremendous assault at the base of Messines Ridge. These movements caused the fall of Armentières. On the 11th the Germans launched an attack all along the front from La Bassée to the Ypres-Comines Canal and took Estaires and Steenwerck. The Germans, as in their previous offensive, were making rapid advances in the centre toward Hazebrouck, but were checked by the defense around the wings at Ypres and Arras. Unless one or the other of these wings could be pierced the German advance was bound to be stopped before it could reach its main objective at Hazebrouck. By the 13th the Germans were only 5 miles from Hazebrouck. The seriousness of the British position may be gathered from General Haig's statement to his troops on April 12, "Many among us are now tired. To those I would say that victory will belong to the side which holds out the longest. Every position must be held to the last man. There must be no retirement. With our backs to the wall, and believing in the justice of our cause, each one of us must fight to the end. The safety of our homes and the freedom of mankind depend alike upon the conduct of each one of us at this critical moment."

Although it appeared that the German offensive had slowed up on the 14th, on the 15th the Allies met with severe reverses. A terrific assault towards Bailleul and Wulverghem resulted in the capture of Bailleul, Wytschaete and Spanbraekmolen. On the 17th the Germans occupied Poelcappelle Langemarck, and Passchendaele, which the British were compelled to evacuate, in order to escape the dangers of a salient, the base of supplies of which was nearer to the Germans than to the British themselves. The capture of Wytschaete placed the British positions around Ypres in a very precarious situation. Messines Ridge, on which this was located, dominated all the British positions in Ypres and overlooked the means of communication with that city. In order to prevent a serious catastrophe the British retired to a line that ran from Bixschoote to the neighborhood of Zonnebeke. By the 18th their positions were almost identical with those they held after the first battle of Ypres in 1914. The surrender of territory was a terrible blow to British morale and pride. The first and second battles of Ypres had made that city, in the eyes of all Englishmen, what Verdun was to the Frenchmen.

The Germans, checked for the time being in the north, made a heavy assault on Villers Bretonneux, southeast of Amiens, on the 24th. With the aid of a number of tanks, they captured the village. At the same time, just south of this, French and American forces were compelled to abandon an unimportant salient near Hangard, in the valley of the Luce River. Mount Kemmel, which seemed to be the only remaining key to the Ypres salient, was the scene of extremely bitter fighting from April 24 to April 27. The Germans, prodigal of men, made frontal and flank attacks on the positions, until by sheer weight of men and metal they compelled the Allies to relinquish the height, as well as the villages of Kemmel and Dranoutre. Ypres did not fall as was expected because of the failure on the part of the Germans to capture Mont Rouge, Mont des Cats, Scherperberg, and several other hills that belonged to the same range as Mount Kemmel.

The second great German thrust was ended. It failed to accomplish its purpose, although approximately 800 square miles of French and Belgian territory were occupied. The significant fact that remained after these two German attempts to gain a decision was that the 15-mile front between Lens and Arras held. This prevented the Germans from broadening their salients and thus, in a sense, limited the depth of their penetration inasmuch as a narrow salient is constantly in danger of being "pinched."

Forcing of the Aisne and the Marne. The fact that the defensive around Arras, particularly Vimy Ridge, and around Ypres, particularly Mont Rouge, held against all assaults, forced the Germans to turn to the southern side of the Picardy salient and attempt to widen it there. Hindenburg would undoubtedly have preferred to attack the British army again, but as that would require a large amount of preparation, he decided to go through with his plans on the Aisne, in order to keep the offensive. A few days previous to the beginning of the battle of the Aisne heavy artillery fire in the Picardy and Ypres salients seemed to presage an attack in those localities. When the real direction of the attack was revealed and the Germans forced the Chemin des Dames positions and the Aisne River with comparative ease, many critics believed that Marshal Foch had been out-generaled and out-manœuvred. Later events proved that he had adopted the best course of action, because, while he could doubtless have held these positions at great cost, he achieved far better results by permitting the Germans to advance in the centre while holding

them on the wings, thus placing them in a vulnerable position.

On May 27, the Aisne offensive began. As in the previous two, great concentrations of men and material were made by the Germans with comparative ease, and apparently without the knowledge of the Allies. A three-hour artillery preparation, composed mainly of gas, with a sprinkling of high explosives, preceded the infantry attack. The attacking force comprised 250,000 of the best fighting men in the German army. The British and French defenders consisted of between 50,000 and 75,000 men. The attack was on a 40-mile front from around Vauxaillon, near the Ailette, to Reims. The chief attack was near Craonne and its purpose was to outflank the Chemin des Dames, in case it could not be taken by frontal assault. The entire Chemin des Dames line was overrun on the 27th, and the Allies retreated across the Aisne between Vailly and Berry-au-Bac, a distance of 18 miles, in relatively good order. On the 28th, the Germans drove forward about 6 miles on a 9-mile front between Vauxaillon and Cauroy, took about 20 towns and villages, crossed the Aisne and Vesle Rivers and reached Fismes on the southern bank of the latter river. The Allies were falling back in the centre, but on the Reims side they held the Thilloix-Savigny-Brouillet line which protected that city. An attempt was made to do the same on the western side to protect Soissons, but the line failed to hold. The same day also saw the end of the German assaults in the Ypres and Picardy sectors, which were intended to divert attention from the main battle. The Allies recovered their lines on the Lys-Ypres front east of Dickebusch Lake. The American 1st division took Cantigny, near Montdidier, after a brilliant assault, and held it against several strong counterattacks.

On the 29th Soissons fell after an extremely heavy bombardment of high explosive and incendiary shells. On the 20th the Germans continued their advance in the centre but were checked on the flanks. They captured Fère-en-Tardenois and Vezilly, and forced the Allies back on Reims, but in the south were held along the Soissons-Château-Thierry highroad. They succeeded in wiping out the salient south of Noyon from the Oise canal to Soissons. The 31st saw an 8-mile drive to the Marne, which was reached on a 6-mile front from Château-Thierry to Dormans. Attempts in the next few days to broaden this front, particularly in the direction of Epernay, were severely repulsed.

On June 15 the Germans began to widen this salient to the westward. They pushed 6 miles in that direction along the Ourcq, a tributary of the Marne. This drive brought them beyond Neuilly and Chony and reached Nouvron and Fontenoy northwest of Soissons. A heavy assault against Reims, with the intention of smashing the eastern side of the salient, was severely checked before it made any headway. The tide of battle was now slowly but surely swinging to the side of the Allies. Although the Germans had almost 500,000 men across the Aisne, General Foch, by calling on the British, French, American, and Italian reserves, presented at least an equal number to them. On the next day French counterattacks in force slowed up the German drive westward.

The German advance had now practically stopped and during the next few days, the French, with the assistance of the Americans, not only stopped the Germans, but drove them back in the neighborhood of Château-Thierry. On June 6, Franco-American troops advanced nearly a mile in the vicinity of Veuilly-la-Poterie, and Americans took Torcy and Bourescheș, which they held against strong counter-assaults. The subsequent activities of the Americans in this sector will be treated in the following section. On June 18, a terrific attack on Reims, carried out by 40,000 Germans, was completely crushed.

The German War Office announced that 45,000 prisoners and 400 guns had been captured; 650 square miles of territory had been occupied, and the Germans had advanced a maximum depth of 30 miles, and created another salient with a narrow tip, only 6 miles, along the Marne. No considerable strategical advantage had been gained, unless it be the fact that the Germans were now only 44 miles from Paris instead of 62. The price paid to gain what was merely a geographical advantage, was conservatively, 110,000 men, killed, wounded, and captured.

The Offensive Against Compiègne. The battle of the Aisne and Marne left the Germans in a very precarious position. The salient had to be widened, strongly fortified, or else abandoned. The line from Château-Thierry was in the shape of a huge crescent with the bend facing towards the Germans. The German plan was to link up the Picardy salient with the Marne salient and thus wipe out the huge bulge in their line and to capture Compiègne, Compiègne Forest, and Villers Cotterets Forest and then use the first mentioned place for a direct attack on Paris. The capture of Compiègne was considered absolutely necessary because of the insufficient line of supplies for the troops in the Marne salient. The capture of Compiègne would open up the Liége trunk line and solve the problem of supply. The river valleys of Aisne, Oise, Marne, and Ourcq would then be available for a converging attack on Paris, the nerve centre of France. The strategy of the offensive was sound but its execution failed. In five days the Germans suffered one of their most ghastly failures of the entire war The offensive lacked the element of surprise, which, undoubtedly, was the chief cause of the initial successes of the earlier offensives. The French command had made a minute survey of the field and placed artillery and machine guns in such position as to enfilade all avenues of attack. They also made provisions, in case of initial German successes, to check their forward movement on second and third defense lines, as carefully prepared as the first. The French plan was to hold this front line lightly and resist the enemy on the combat lines, which were out of range of the German light artillery.

The attack was preceded by a heavy artillery attack, again mainly composed of gas, which lasted from midnight until 4.30 in the morning of the 9th of June when the attack began on a 20-mile front from Montdidier to Noyon. As in the previous battles the Germans advanced in the centre but were held on the flanks. The total advance on the first day was 2½ miles and was only attained after frightful losses. The French made a heavy counterattack on the very first day between the Oise and the Aisne, which showed that the forces on both sides were nearly equal. On the next day the Germans

advanced about 3 miles farther and captured, after extremely bitter fighting, Mery, Belloy, and St. Maur. The German penetration was now about 5 miles and this was approximately the depth of their entire advance.

On the third day the Germans were compelled to bring up fresh divisions and, with their aid, reached the Aronde River, a small stream on the western side of the battle line. They also advanced a mile along both banks of the Matz River and almost reached its junction with the Oise on its northern bank On the eastern end of the battle line, Ourscamps Forest was enveloped. This day was the turning-point of the battle, because before it was over, two French counterattacks had driven the Germans back between Ribescourt and St. Maur, and recaptured Belloy, Senlis wood, and the heights between Mortemer and Courcelles. On the next day the French gained further ground between Belloy and St. Maur. The Germans forced a crossing of the Matz, but on the 13th the French again counterattacked in force and drove the Germans back across the Matz. This ended the German offensive which resulted in the using up of over 300,000 German troops and the actual putting out of action of 80,000. No strategical advantage was gained.

A word should be spoken here of the activities of the Franco-American troops in the neighborhood of Château-Thierry. On the 10th, American marines moved forward in the Belleau Wood and by the next day had captured all of it The Americans also crossed the Marne on scouting expeditions.

Second Battle of the Marne. On July 15, Ludendorff opened his fifth and what proved to be the last German offensive of the year. It also proved to be the last German offensive of the War. It was under the personal direction of the German Crown Prince and was called "Friedensturm" (peace offensive). The whole line attacked was roughly 60 miles long and extended from Château-Thierry to Dormans, around Reims, and then east almost to the Argonne Forest. It is estimated that the German Crown Prince had more than 800,000 men available for this "peace offensive." The plan of attack was to encircle and capture Reims by taking the Reims mountains, and also to get control of the railway centre of Epernay, which would compel the French to give up the entire Champagne line, which was very strongly fortified, and thus leave the centre in a very vulnerable position. The capture of Reims would also solve the supply question of the overextended Marne salient.

The attack began at 6 A.M. on the 15th. The first blow was aimed at the Americans on both sides of Château-Thierry. The Germans crossed the Marne in June southeast of Château-Thierry between Fossay and Mezy, compelling the Americans to retire on Condé-en-Brie. Here a counterattack was immediately organized, which drove the Germans back across the river and left 1500 prisoners in American hands On other positions of the front the Germans were more successful. They crossed the Marne east of Dormans and advanced astride it in the direction of Epernay. At Bligny, southwest of Reims, they penetrated positions held by Italian troops and thus threatened to get in the rear of Reims. Southeast of Reims, the Germans made a fierce attack east of Prunay, with the idea of squeezing out the city, in conjunction with the advance at Bligny. General Gourand's IV army put up a magnificent resistance and held the Germans to very slight gains after inflicting appalling losses on them. The 42d American division formed part of this army. On the 16th and 17th, further attacks against the American forces were checked almost before they had started, but the pockets around Bligny and Prunay, southwest and southeast of Reims, respectively, were deepened. Everywhere else the Germans were held or driven back by counterattacks. The distance across the base of the Reims salient was scarcely 10 miles, which shows the critical position of this Allied bulwark. It is estimated that the Crown Prince in this "peace offensive" used 400,000 men, just one-half of those available, and that at the end of three days one-fourth of those employed were on the casualty list.

The Allied Offensive. The great German offensive begun in March was finally terminated on July 17 and the Allied counteroffensive began on the following day. In this counteroffensive there were two distinct periods although the fighting was practically continuous. The first period was that covered by the operations that ended in the compulsory retirement of the Germans not only from the three great salients made by the advance of their armies in 1918—the Marne, Somme and Lys salients—but also from the St. Mihiel salient captured in 1914. This period ended about the middle of September. This was followed by the final campaign in which the Allied armies advanced in practically a continuous line from the Channel to the Meuse River; it ended with the Armistice. This period began about the 25th of September and ended November 11.

Marne Salient. As early as June 1, General Pershing saw that the Marne salient was inherently weak, and suggested to Marshal Foch an immediate attack along the western face toward Soissons. Marshal Foch was strongly impressed by Pershing's plan but determined to wait until he had a preponderance of force. By the middle of June a plan for a counteroffensive, drawn up by General Pétain, in conference with Generals Fayolle, Mangin, and Degoutte, had been approved by Marshal Foch. While the Crown Prince was attempting to encircle Reims and cross the Marne the details were being worked out. The plan was to strike on the western side of this salient along the line between Soissons and Château-Thierry. The preparations for this counterattack were kept very secret. Vast quantities of supplies were stored up in the Villers-Cotterets forest, which lent itself admirably to the purpose. Great numbers of men of the army of manœuvre (the existence of which the Germans doubted) were concentrated in the ravines and valleys of this forest without detection by the enemy.

The Allies attacked on July 18 on a 28-mile front from Amblény, west of Soissons, to Bouresches northwest of Château-Thierry. The attack was made without artillery preparation, the advancing infantry being protected by large numbers of tanks and a creeping barrage. It was made by Franco-American troops, the latter being most prominent in the Soissons and Château-Thierry regions, actually being the spearhead of the attack in the former place. The blow took the Germans completely by surprise, and, as a result of it, and the vulnerability of the German lines, the Crown Prince and his ar-

miles were driven across the Vesle. The hinge of the entire German retirement was the high ground around Chaudon, southwest of Soissons. The first push netted the Allies a 6-mile advance to the Crise River, which runs around the Chaudun plateau and which joins the Aisne at Soissons. This brought General Mangin and his Franco-American force to within a mile of the city, but the German High Command continued to hurl in fresh divisions in this vicinity, which effectively prevented the retreat from becoming a rout. The Allies also advanced from 2 to 3 miles astride the Ourcq, and the whole German line from Soissons to Château-Thierry began to retreat. Assaults carried out by British, Italian, and French troops, along the line from Château-Thierry to Reims won initial success but were unable to make a breakthrough similar to that on the western side.

Château-Thierry was evacuated on the 21st and on the same day Franco-American troops crossed the Marne and advanced 4 miles toward the Ourcq. By the 23rd the entire Soissons-Château-Thierry highroad, with the exception of a small portion south of Soissons, was in the hands of the Allies. On the eastern leg of the salient the British and Italian troops achieved local successes, but were unable to make a hole big enough to threaten the rear of the enemy. They did keep many German divisions actively engaged which might otherwise have been used to stem the Allied advance. On the 24th the Franco-American forces advanced 2 miles north of Château-Thierry and the British penetrated the German lines in the neighborhood of Vrigny on the eastern leg of the salient. On the next day the Germans made a heavy assault against the eastern leg, with the hopes of widening the salient, but they were thrown back everywhere. On this day the French captured Oulchy, and, together with the Americans, occupied 40 square miles of territory. After a week of severe fighting, the Crown Prince was using every effort to extricate his armies in the best possible shape out of a salient of which the neck was scarcely 20 miles wide. A German counter-offensive or another attack against Ypres which Hindenburg had planned for August, were out of the question.

By the 27th the Germans were in full retreat and on the 28th they abandoned the line of the Ourcq. On the eastern side of the salient the Allies crossed the Reims-Dorman highway after bitter fighting. This threat to completely crush the Germans resulted in severe fighting in the vicinity of Vrigny and St. Euphraise. The advance to the Vesle River was marked by extremely heavy fighting between the Prussian Guards and American forces at Sergy and Seringes. The former place changed hands nine times and the latter five before remaining in the hands of the Americans. On the 31st, the Germans made bitter but unsuccessful efforts to keep the Americans from Nesles forest. On August 1 the Allies struck on a 10-mile front north of La Fère, penetrated 2 miles, captured the height north of Grand Rozoy, and advanced to Cramoiselles. This effectively broke the hinge around Soissons and enabled the French to enter the city on the 2d after bitter street fighting. The advance on the 3d was 6 miles deep in some places and recovered more than 50 villages, the most important of which was Fismes. The Germans were now completely behind the Aisne-Vesle line and made desperate attempts to hold the north bank of the latter river with the aid of the heavy artillery on the far side of the Aisne. The results of the first Allied offensive of the year were enormous—35,000 prisoners and more than 500 guns were in Allied hands. The Germans at home, as well as in the field, were convinced that their armies were not invincible. On the other hand the morale of the Allies was considerably heightened both by the German defeat and the spirited fighting of the American soldiers.

Somme Salient. On Aug. 8, 1918, Marshal Foch struck his second great blow. In many ways it resembled the Marne offensive. His aim was to "pinch" the overextended salient in Picardy, reaching out toward Amiens. He was making his plans and preparations for this attack while the offensive was being carried out on the Marne. The immediate objective was the railroad running from Péronne to Roye.

The attack was on a front approximately 30 miles long from Amiens to Montdidier. Later this front was extended all the way to Soissons. The element of surprise was entirely with the Allies. The Allied aircraft, artillery, and tanks, worked in complete harmony with the infantry. The British IV army, under Rawlinson, struck the Germans, under von der Marwitz, before Moreuil, and, in three days, drove them back 15 miles in some places and an average of 10 miles along the entire line. Most of the advance was on the plateau just south of the Somme River. During this time the French I army under Debeney, who were supporting the right of the British, crossed the Avre River in the face of an extremely destructive artillery fire and wiped out strong enemy positions, which threatened to outflank Rawlinson's advance. When he had accomplished this, he and Rawlinson began a concerted advance in the general direction of the Hindenburg line. By the 18th the Germans had retreated to the Albert-Chaulnes-Roye-Lassigny line and had lost most of the Lassigny plateau. On the 13th the French struck between the Oise and the Matz Rivers and captured Canny-sur-Matz. This blow also threatened Noyon, since that place was dominated by the artillery along the banks of the Oise.

On August 20 Mangin, with the aid of American troops, launched an offensive from the Oise near Ribecourt to the Aisne near Soissons. This was a part of Foch's plan to keep the whole line in action so that the German High Command would have great difficulty in bringing up reserves. Probably it was the activity of the Franco-Americans from Montdidier to Reims that enabled the British to make such huge strides to the Hindenburg line without suffering severe losses. The object of Mangin's blow was to secure the control of the plateau between the two rivers. Ten thousand prisoners fell into the hands of the Franco-American troops. On the same day Lassigny fell and the Germans evacuated Ourscamps Forest. On the 23d, the French advanced 7 miles along the front from Lassigny to north of Soissons. They captured several villages and crossed the Ailette River. On the 23d the III French army crossed the Divette River, near Avrincort, and General Mangin's X army crossed the Oise River and the Oise Canal at Manicamp 8 miles east of Noyon and reached the outskirts of Morlin-

court, which seriously threatened the entire Noyon salient.

Roye fell on the 27th, Chaulnes on the 28th, and Noyon on the 29th. The operation which resulted in the capture of Chaulnes drove forward 8 miles and made it certain that the German retreat could not stop short of the Hindenburg Line.

On the 30th, Mt. St. Siméon northeast of Noyon was completely occupied and the Franco-Americans captured Juvigny, a small town north of Soissons, which was of great strategic importance because it controlled the Juvigny plateau. The entire line of the Roye-Noyon-Soissons railway was now in the hands of the Allies. During the next five days the Franco-Americans saw bitter fighting, but nevertheless made advances of an extremely important nature. They gained a strong foothold on the Soissons-St. Quentin highway, by the capture of Terny-Serny. In conjunction with this advance on and from the Juvigny plateau the French made rapid progress up the Ailette River and captured Crecy-au-Mont and Leury (September 1). The result of this drive between the Oise and the Aisne in the neighborhood of Soissons was to outflank the German positions on the Vesle. Consequently, on September 4, the Germans began a hasty retreat on a 20-mile front from the river, setting fire to ammunition dumps and other supplies that they could not take away with them. Their retreat was covered by the heavy artillery on the north bank of the Aisne and the Chemin des Dames. Franco-American troops forced a crossing of the Vesle on the first day of the retreat. By the eighth, the Allied troops were fighting around Villers-en-Prayères and Revillon. By the middle of the month the Germans were everywhere thrust behind the Aisne in this region as far as Vailly. The French now began preparations to make a direct assault on the St Gobain forest and the western end of the Chemin des Dames. Laon could be seen in the distance.

In the meantime, the other French armies operating just south of the Somme River were making rapid strides toward the Hindenburg line. On September 4 the French gained northeast of Noyon and forced the Germans to beat a hasty retreat over the territory between the Canal du Nord and the Oise. On the 6th, Ham and Chauny fell and the French advanced 6 miles in some places east of the Canal du Nord. During the next few days they made slow progress astride the Oise in the direction of La Fère. When the fighting slowed down the French and Americans were practically in the positions held by the French before the Hindenburg line previous to the huge offensive of March 21.

The beginning of this section related that Rawlinson smashed the southern side of the Amiens salient by striking from Albert to Montdidier. Foch gave the Germans no rest. After Rawlinson's blow had exhausted its possibilities, he hurled Byng's III British army north of the Somme and took Bapaume, and when this blow exhausted possibilities he hurled Horne's I British army astride the Scarpe and actually broke the Hindenburg line, besides threatening Cambrai and Douai.

On August 21, Byng struck on a 10-mile front from the Ancre River to Moyenneville and took seven villages. In the course of the next day's fighting the British captured Albert, after bitter street fighting, and advanced 2 miles on a 6-mile front. A similar gain was made the next day from Bray to the vicinity of Grandcourt, which resulted in the seizure of nine villages and an imminent threat to outflank Bapaume. On the 24th, the British captured Bray on the Somme, 10 other towns and the famous Thiepval Ridge captured by the British in the Somme drive of 1916. The British swept on despite stiffening resistance and the utter disregard with which the Crown Prince of Bavaria hurled his reserves into the fray; 12 more villages and the Albert-Bapaume highway were seized on the 25th. After steady pressure the Germans were compelled to give up Bapaume on the 29th, and to begin a retreat along the whole line southward to Péronne and Brie on the Somme. Two days later the Australians in a brilliant assault stormed Mt. St. Quentin and Feuillancourt. The former position is the key to Péronne and this city fell on the first of September, along with Bouchavesnes and Rancourt.

The interest of the drive toward the Hindenburg Line now centres in the advances made by Horne's army, which struck astride the Scarpe, when Byng's forward movement began to slow up. Nevertheless it was the success of Byng's push that made Horne's attack possible. Horne's blow was tremendously successful because it not only broke the Hindenburg line at its northern end but broke the famous Drocourt-Quéant switch line as well. The very first day of the new drive, August 26, saw the piercing of the Hindenburg line. The Canadians captured Wancourt and Monchy-le-Preux. On the next day they smashed through the Hindenburg line for 4 miles southeast of Arras, and occupied Cherisy, Vis-en-Artois, and the Bois-du-Sait. Scotch troops crossed the Sensée River just south of the Cojeul and captured Fontaine-les-Croiselles, besides seizing Rosux and Gavrelle, north of the Scarpe. On the 28th, the Germans lost Croisselles and the Canadians took Boiry and Pelves behind the Hindenburg Line. Bullecourt was reached on the 29th, and the British were face to face with the Drocourt-Quéant line which had held them up in their Cambrai offensive at the end of 1917 (see *supra*).

The Drocourt-Quéant line was a very formidable line of defense intended to be a second barrier to the great bases at Cambrai and Douai. It branched off from the main line at Quéant and then ran almost parallel to it to Drocourt. The British attacked it at 5 o'clock on the morning of September 2, under the protection of an extremely heavy barrage fire. In their first attack the British penetrated 6 miles of the lines to a depth of 4 miles. During the second day, the British having broken the line, penetrated 6 miles along a front of more than 20 miles. Quéant was taken by storm, along with a dozen towns and villages. More than 10,000 prisoners fell to the British in this one operation.

They now settled down to a slow but steady advance along the Bapaume-Cambrai road. It might be added here that Lens was evacuated by the Germans on September 4, but the Allies were unable to occupy it immediately because it was saturated with poison gas. By the 12th, Havrincourt, Mœvres, and Trescault were in their hands, and the threat toward Cambrai increased.

Lys Salient. In order to save the Crown Prince of Bavaria's army from an overwhelming defeat similar to those suffered during the "pinching" of the Marne and Picardy salients, the German High Command determined to withdraw from the overextended salient south of Ypres. This withdrawal was accelerated by short, sharp blows by the British. The first retirement was in the neighborhood of La Bassée on August 5. This movement was followed by an attack on the Lawe River which advanced more than ½ mile on a 5-mile line. Two days later the British made an advance between the Lawe and Bourre Rivers which penetrated 2000 yards and occupied five villages, including Locon. Haig then struck due west of Armentières, between Bailleul and Vieux-Berquin, and captured Outtersteene. These attacks were made on the side of the salient and besides joining almost all of its area, placed the tip pointing toward Nieppe Forest, in a serious position.

Merville, almost at the tip of the salient, was entered on August 19, after an advance by the British on a 6-mile front. On August 30, the Germans evacuated Bailleul, and the next day the famous Kemmel Hill. Haig had planned to take this hill by assault with the aid of the American divisions, but the German withdrawal forestalled him. The British on the same day advanced along the Lawe River on the southern leg of the salient. On September 2 American troops north of Wytschaete were thrown into battle and captured Voormezeele, while the British were taking Neuve Eglise and some territory east of Estaires. Early in September the IV and VI German armies were ordered to evacuate the Lys salient to economize troops.

St. Mihiel Salient, and the American Army. By September 12, Foch realized that he had exhausted the possibilities of further immediate advance against the Hindenburg line. Instead of resting, which of course, would permit the Germans to rest also, he hurled the American army against the St. Mihiel salient, and reduced it, thus confronting the Germans with the necessity of defending Metz and the Briey iron fields. This salient, enclosing the Woevre plain, and with its tip extending to the Meuse, had existed since the first year of the war. One of the most important results of Pershing's successful offensive was the freeing of the great railway system running through Verdun, Toul, and Nancy. It was the loss of this railway that greatly hampered the bringing up of reserves during the Crown Prince's tremendous assaults on Verdun.

Pershing was able to form his distinctly American force only with the greatest difficulty The Allied attitude from the beginning had been one of absorption. France and Great Britain and even Italy requested that the American troops be used to reinforce Allied troop units. General Pershing stoutly insisted on the foundation of an American army which should be thoroughly trained in open warfare and deliver an American blow against Germany on a definite front. After considerable argument and many conferences Pershing finally won his point, and as the first step he organized seven army corps. The American army was formed on the Vesle front but it was secretly transferred to the Woevre front with headquarters at Neufchâteau. It was given the mission of reducing the St. Mihiel salient by Foch, at Bombon, on July 24. General Pershing took command of the army himself.

Pershing's general plan was to make a feint toward Belfort, and then in a surprise attack strike at both sides of the salient and advance to the centre while carrying on a holding engagement at the nose of the salient. The battle order from left to right was as follows:

The Southern Force. The American 1st Corps (General Liggett) with right near Pont-à-Mousson, had divisions on the line as follows: 82d (Burnham), 90th (Allen), 5th (McMahon), and 2d (Lejeune), with the 78th (McRae) in reserve. The American 4th Corps (Dickman) with right joining the left of the 1st Corps had divisions on the line as follows: 89th (Wright), 42d (Menoher) and 1st (Summerall) with the 3d (Buck) in reserve.

Central Force (French). The French 2d Colonial Corps (Blondlet) with right joining the left of the American 4th Corps, had French divisions in the line as follows: 39th, 36th, and the 2d Cavalry division (dismounted).

The Western Force. The American 5th Corps (Cameron) with the right joining the left of the French 2d Colonial Corps, had divisions on the line as follows: 26th (Edwards), 4th (Hines), and the French 15th.

The west of the line was near Watronville. General Pershing held the 35th and 91st Divisions (Traub and Johnston) in rear of the western face of the salient, in reserve, and a general reserve consisting of the 80th Division (Cronkhite) in rear of the western face and the 33d Division (Bell) in rear of the southern face.

The chief attack was made on the southern leg on a front extending about 12 miles due west of Pont-à-Mousson. The attack on the western leg extended for a distance of about 8 miles from between Dommartin and Fresnes Simultaneously with these attacks the French destroyed the bridges over the Meuse River at St. Mihiel. The attacks were made at 5 A.M. on September 12, after about four hours' artillery preparation. Foggy weather aided the attackers. The chief resistance was in the west, where the German positions were defended by the heights on the edge of the Woevre plains. The Americans stormed these heights, the highest of which is Les Eparges, and took the villages of Herbeuville, Hattonchâtel, Hanonville, Billy, St. Maurice, Thillot, and Hattonville, and during the night entered Vigneulles, which is at the southern end of the line of hills protecting this side of the salient. On the southern leg of the salient the results were just as successful to American arms, and were carried out with the same precision. During the first day Labayville, St. Bausseaut, Vilcey, Essey, and the important town of Thiaucourt were captured. During the night Pannes, Nonsard, Buxières, and St. Mihiel were captured. Twenty-seven hours after the attack began, the forces advancing from the east and west met at Vigneulles and Heudicourt, and the St. Mihiel salient was no more.

During the next few days the pocket was "mopped up" and the new lines consolidated; 16,000 prisoners, among whom were some Austro-Hungarians, and almost 450 guns were taken. Besides these, vast stores of ammunition, arms and military supplies were captured. Nearly 175 square miles of territory and 70 villages were delivered by the enemy. The

Allies were now in a position to seriously threaten Metz and the great Metz-Mézières trunk railway, one of Germany's main supply lines Another important result, for the Germans as well as for the Allies, was to show that the American forces had reached a stage of development where they could be depended upon to take their full share in the War.

What might be called the first period of the Allied offensive was now over. The result was everywhere favorable to the Allies With the exception of the Aisne region, the Germans were back at their starting-place in March The German people at home, although somewhat buoyed up by false reports, had lost their supreme faith in the army. Vast quantities of supplies and ammunition were captured or destroyed to prevent capture Eight German divisions had been destroyed since the beginning of the Allied offensive up to the middle of September Approximately 200,000 prisoners and 2300 guns had fallen into Allied hands. Almost 300,000 fresh American troops were pouring into France a month. Ludendorff's attempt to retreat to a smaller front was frustrated by Foch's tactics, the fundamental theory of which was to keep the enemy engaged all along the line and not to let him effectively use his reserves. This was the principle of exhaustion and is strikingly similar to Grant's campaign which won the Civil War.

Argonne-Meuse Offensive. As has been related above, Marshal Foch, in the last week of September, began an offensive over the entire front from Switzerland to the sea. He attacked the German right in Flanders, the centre along the Hindenburg line, and the left between Reims and the Meuse River. From the strategic point of view, the German left was by far the most important front. A break-through of any size here would cut the lines of communication between Germany and her armies in France and Belgium. The Argonne-Meuse line was also the hinge of the German retreat in Belgium and northern France, and, if broken, would doubtless cause a huge débâcle. The German defenses on this region, both natural and artificial, were exceptionally strong. The bend in the Aisne, west of the Argonne Forest, the forest itself and the Meuse River, were tremendous natural advantages; the German High Command, realizing the strategic importance of the sector, had placed many of its best divisions there, as well as profusely sprinkling the area with barbed wire and machine-gun emplacements.

After the fall of the St. Mihiel salient, which really paved the way for this offensive, the American army took over the lines from the Argonne Forest and the Meuse River. This army was to coöperate with Gouraud's IV French army, which extended from the neighborhood of Reims to where it joined the Americans in the Argonne. For the opening attack in the American sector General Pershing employed three corps: *Left.* 1st Corps (Liggett), which contained the 77th, 28th, and 35th divisions, with the 1st division in reserve. *Centre.* 5th Corps (Cameron) which contained the 91st, 37th and 79th divisions, with the 3d division in reserve. *Right.* 3d Corps (Bullard) which contained the 4th, 80th and 33d divisions, with the 32d division in reserve. The general reserve included the 29th, 82d, and 92d divisions. Pershing stated "About 2700 guns, 189 small tanks, 142 manned by Americans, and 821 airplaines, 604 manned by Americans, were concentrated to support the infantry. We thus had a superiority in guns and aviation and the enemy had no tanks. The French and Americans hoped to advance on either side of the Argonne and squeeze the Germans out of the Argonne. They were unable to do this in the first attack as they were temporarily held up by German second positions."

First Phase. The preliminary bombardment began at 11 P.M on September 25 and at 5.30 A.M. on the 26th of September the infantry attack was launched. The French advanced 4 miles and the Americans about 6. By the 28th the Americans had taken Montfaucon, Exermont, Garcourt, Cuisy, Septsarges, Malancourt, Ivoiry, Epinonville, Charpentry, Very, and 10,000 prisoners. The French took Sevron, the Butte des Mesnil, and Navarin Farm. The Americans were within range of the Kriemhilde line which extended from Grand Pré to Damvillers across the Meuse. East of the Meuse the Americans captured Marcheville and Rieville, which strengthened the flank of the army west of the Meuse. On the 29th and 30th, Gouraud advanced to within 5 miles of Vouziers.

Second Phase. The second phase of the Argonne-Meuse offensive was carried out by the 1st, 5th, and 3d Corps and lasted from October 4 to 31. In the first part of this phase the American army encountered its hardest fighting of the War. About the middle of this period, General Pershing divided the American forces into the I and II armies. The I army, which was assigned to General Liggett, extended from the Argonne to Fresnes-en-Woevre. The II army, extending from Fresnes to the Moselle, was commanded by General Bullard. Beginning on the 4th, the I American army captured Cesnes, and advanced 2 miles up the Aire River valley. On October 5, the Germans before Gouraud retired along a 12-mile front closely pursued by the French army. By the 11th, the French held the whole line of the Suippe River and the Americans had seized the heights dominating the Aire valley. So far the French had taken 21,000 prisoners and 600 guns. On the 14th, the Americans took St. Juvin, and two days later took the important town of Grand Pré and Champigneulles. On the 17th Romagne fell and the Americans were everywhere beyond the Kriemhilde positions. During the next day Banthéville and Talma Farm were seized in surprise attacks. They changed hands several times before remaining in the possession of the Americans. On the same day the French crossed the Aisne near Vouziers, and made important gains toward Rethel.

The only German defense between the Americans and the Belgian border was the Freya-Stellung which ran from near Dun-sur-Meuse to the Bourgogne wood. About 10 miles north of this line was the great trunk railway line running from Metz to Mézières, through Sedan and Montmédy. Part of the Freya line was seized on October 26 and the railway line was bombarded

Last Phase and Pursuit. In connection with this phase of the Argonne-Meuse offensive, General Pershing states, "On the 21st my instructions were issued to the I army to prepare thoroughly for a general attack October 28 that would be decisive if possible. In order that the

attack of the I army and that of the IV French army on its left should be simultaneous our attack was delayed until November 1.

"On this occasion and for this first time the army prepared for its attack under normal conditions. We held the front of attack and were not under the necessity of taking over a new front with its manifold installations and services. Our own personnel handled the communications, dumps, telegraph lines and water service, our divisions were either on the lines or close in rear, the French artillery, aviation and technical troops which had previously made up our deficiencies had been largely replaced by our own organizations, and our army, corps and divisional staffs were by actual experience second to none."

On November 1, both General Pershing and General Gouraud began their final advance The latter crossed the Aisne between Rethel and Vouziers, and advancing with Berthelot's army on the left, reached the outskirts of Mézières, when the Armistice went into effect (November 11). General Pershing's forces reached Sedan on the 6th. Between that date and the 11th, east of the Meuse, he seized the heights of the Woevre, and had brought Metz into offensive gun-fire range.

The Franco-American advance in the Champagne-Argonne-Meuse region cut the German main line of communication (mentioned above) and foreordained a complete defeat within a very short time for Germany, had the Armistice not intervened Some of the bitterest fighting of the War occurred in this section. Most of it was hand to hand and the nature of the ground, with its ravines, gullies, forests, etc., made it necessary to wipe out machine-gun nests with infantry rather than with artillery. The Americans captured 26,000 prisoners and 468 guns. The French took about 30,000 prisoners and 700 guns It is estimated that the Germans lost 150,000 men trying to defend their main line of communication.

American Troops in France. On Armistice Day, 42 American divisions had either reached France or were en route; of these, 29, including replacements from the other divisions, were actually engaged in combat. Of the latter, 7 were Regular divisions, 11 National Guard divisions, and 11 National Army divisions The total American forces sent to France is given as 2,084,000 of whom it is estimated that 1,390,000 took part in campaign; of the latter 1,100,000 as divisional troops, 240,000 as corps and army troops, and 50,000 in the service of supply

The casualties in the American army were about 260,000, of whom about 50,000 were battle deaths As the army met with no serious reverses, the number of prisoners taken by the enemy was small, only 4500. The casualties occurred mainly between May 28, 1918, when the 1st division attacked Cantigny, and November 11. In its operations it captured 63,000 prisoners and about 1400 pieces of artillery in addition to other arms and stores.

Breaking the Hindenburg Line. In the section treating the German retreat to the Hindenburg line it was narrated how certain sectors of this line were penetrated and how the Quéant-Drocourt line was smashed This section will deal with the breaking of the line itself, the capture of Cambrai, St Quentin, and Laon and the advance across France and Belgium until the Armistice put an end to the fighting. The reader must bear in mind that while this tremendous drive was pushing the centre back the Allies were crushing one flank in Flanders and the other in the Argonne-Meuse region. In the bitter fighting that resulted in the breaking of the famous defense system, the 27th—O'Ryan—and the 30th—Lewis—American divisions played important parts.

Although the main attack was made on September 29, important advances in the direction of Cambrai were made on the 27th, when Byng and Horne with the American 2d Corps—Graves—(27th and 30th divisions) struck on a 14-mile front before Cambrai, crossed the Canal du Nord, and pierced the outposts of the Hindenburg line. On the 28th, Marcoing, Fontaine-Notre-Dame, Cantaing, and Novelles were taken. On the 29th, Rawlinson, with the aid of the Americans, struck on a 30-mile front from St Quentin to the Sensée Canal The former crossed the Scheldt Canal and the latter, after seizing Ballicourt and Nauroy, entered the suburbs of Cambrai itself Horne now attacked in the Arras sector and advanced toward Douai by capturing Oppy and Biache-St. Vaast. This compelled the Germans to retire from the Lens coal-field region. Byng, by crossing the Scheldt Canal northwest of Cambrai, threatened the city from that direction.

While these operations were going on around Cambrai, the fate of St Quentin was being sealed After nibbling operations, the French and British captured Thorigny and Le Tronquoy, about 3 miles from the city (September 30). On the first of October, Debeney's army occupied part of the city, and the next day seized all of it. In the meantime Rawlinson's army forced the Scheldt Canal and occupied Le Catelet and Beauvoir.

On October 9 a great drive covering the whole line from Cambrai to the neighborhood of St. Quentin was begun without artillery preparation. It was a tremendous success, penetrating 9 miles on a 20-mile front Cambrai was occupied on the very first day, which necessitated a further retreat on the Arras-Lens front, toward Douai By the 10th the British had advanced their lines to the Selle River between Solesmes and St. Souplet, and captured the important German base of Le Cateau. On the next day the Germans abandoned the line along the Sensée River and the Allies were closing in on Douai This city fell on the 17th.

On the 20th, the British forced a crossing of the Selle north of Le Cateau and on the 22d advanced from northwest of Tournai to southwest of Valenciennes, patrols actually reaching the suburbs of the latter city. On the 25th the Valenciennes-Le Quesnoy railway was reached on a 7-mile front On November 2, Valenciennes fell after a pinching operation, and they advanced along the road to Mons. On November 4, the British and Americans struck a 20-mile front between the Scheldt and the Oise-Sambre Canal and forced the Germans to make a retreat on a 75-mile front from the Scheldt to the Aisne. As a result of this the French took the fortified city and railroad centre of Hirson, and the British captured the fortress of Maubeuge on the 9th of November. On the 11th, the last day of fighting, the British captured Mons, the scene of their defeat and retreat in August, 1914.

In considering the breaking of the Hindenburg line, the events that occurred between the Oise and the Aisne and which resulted in the capture of Laon and the Chemin des Dames, must be included. Foch determined to use his "pincers" method on a large scale in order to capture Laon. To accomplish this he had to advance through the formidable forest of St. Gobain and recapture the Chemin des Dames positions. After the "pinching" of the Marne salient (July, 1918) the Franco-Americans had nibbled away at the German positions to get a good place to start their offensive. The Americans had taken the Juvigny plateau and later the French seized the Vauxaillon plateau just south of the Aisne. The German Crown Prince made repeated and bitter attacks to retake these strategic positions, but they were futile as well as costly. On September 28, General Mangin's Franco-American army captured Fort de Malmaison, the old limestone position which is in the rear of the Chemin des Dames. Then began a slow advance between these positions and the Ailette River as well as between the Aisne and the Vesle. Berthelot's V army in conjunction with Mangin's X army and with the aid of Italian troops, began an advance northwest of Reims, which resulted in the capture of Berry-au-Bac on October 7. On the 9th, Bazancourt and Vaux-les-Mauron fell. By the 12th, Mangin had succeeded in occupying practically the entire Chemin-des-Dames positions. The next day saw the success of Foch's strategy because the St. Gobain Forest, La Fère, and Laon were evacuated by the Germans with scarcely any fighting.

The French armies of the left now advanced rapidly between the Aisne and the Oise Rivers with the idea of reaching the Franco-Belgian frontier between Hirson and Mézières. When the Germans began their retreat between the Scheldt and the Aisne, the French armies of the left exerted strong pressure on the German flank. By the 8th of November they were at the outskirts of Mézières, but were unable to capture it before the Armistice was signed on the 11th.

Thus ended the battle or series of battles which resulted in the breaking of the Hindenburg line and which were also largely responsible for the Germans suing for an armistice. The occupation of the east bank of the Meuse north of Verdun by the Americans left the Germans with no easily defended line west of the Rhine. It is extremely doubtful whether the Germans could have reached the Rhine with sufficient men, material and organization, to prevent an invasion of Germany by the Allies on a grand scale.

Operations in Belgium. The opening attack on September 28 was made by the reorganized Belgian army, under the personal direction of King Albert, and the British II army, under Plumer, on a 10-mile front from Dixmude to Passchendaele Ridge, north of Ypres. This initial attack penetrated 4 miles. On the next day the Belgians captured Dixmude, Passchendaele, Stadenberg, Mooreslede, and Zarren and were only 2 miles from Roulers. On this same day the British took the formidable Messines and Passchendaele Ridges and Gheluvelt. On the 1st of October, the Allies crossed the Menin-Roulers road and struck in a southerly direction, reaching the Lys River between Warvioq and Warneton.

The threat to develop the industrial centre of Lille had now become so pronounced and had created such a serious position for the German forces that the German command determined to evacuate it, which necessitated retirement from the Belgian coast Consequently, on the 2d the Germans began the evacuation of the city and a retreat on both sides of La Bassée Canal. This retreat was accelerated by the joining of Degoutte's VI French army to the Belgian and British armies. The Belgians captured Hooglede and Handzeeme northeast of Roulers, and the British seized Rolleghencapelle, between Courtrai and Roulers. Armentières was entered on the same day.

After a week and a half of further preparation, the Allies struck an extremely heavy blow aimed at clearing the west bank of the Scheldt as far as Ghent. The attack extended from the Lys, near Comines, to the sea. The Belgians drove forward 7 miles north of a line running from Handzeeme to Courtermarck, and the French and British to the Hooglede plateau, Winckelhoek and Lendelede The German forced retreat from Belgium now began in earnest. The Belgians advanced steadily along the roads to Bruges and Ostend from Thourout, and the French advanced toward Thielt, while the British advanced along the Lys from Comines. On the 17th the British entered Lille and naval forces entered Ostend, which had been evacuated. On the next day Zeebrugge was entered, as well as Bruges, Thielt, Courtrai, Tourcoing, and Roubaix.

Between the 20th and 25th of October, the French and British forced the Lys Canal in the direction of Ghent. The British in the south took Bruay and Estain. On the last day of the month Byng's army, with the aid of the 30th American division, struck between the Lys and the Scheldt from Deynze to Avelghem and captured several villages, and towns. While this operation was going on the British and French were driving the Germans back on Ghent and the lines of the Scheldt. The retreat was precipitous. On November 3, the Belgians advanced 10 miles along the Dutch frontier and reached the Terneuzen (Dutch) Ghent Canal. This advance coupled with that of the French and the British in the south brought the Allies to within 5 miles of Ghent. The British forced the Scheldt near Pofter and began an advance on Brussels. Tournai fell to the British on November 9, and when fighting ceased two days later, the line in Belgium ran almost north and south from Terneuzen to north of Audenarde and then southeast to Mons. Marshal Foch is credited with the statement that the German army would have been captured or destroyed within six weeks (after November 11) but he had agreed to an armistice to save lives. More than 60,000 prisoners and 500 guns of all calibres had been captured in this flank movement.

The Armistice. Negotiations between the United States and Germany, which began on October 5, ended on November 5, when President Wilson informed the Germans that Foch had been authorized by the United States and the Allies to open negotiations with accredited German agents. This was followed two days later by announcement that German agents had been appointed and were about to leave the German Headquarters at Spa, Belgium. They were received at Foch's quarters the next day and received the terms of the armistice from

him. A request to stop hostilities until the terms had been sent to the German Headquarters was refused. After several delays the terms were accepted by Germany on November 11 at 5 A.M., Paris time, and the War ended at 11 A.M. that day. A brief summary of the terms follows.

Germany surrendered all her submarines and agreed to disarm her surface men-of-war which were to be interned in neutral ports, or taken over by the Allies. The treaties of Bucharest and Brest-Litovsk were renounced, all damage done was to be repaired and all foreign occupied territory was to be evacuated. An indemnity was to be agreed upon later. The Allies were to occupy the valley of the Rhine. There was to be a neutral zone on the east bank of the Rhine and Allied and American bridgeheads at Mayence, Coblenz, and Cologne, each with a radius of 30 kilometers.

The evacuation of the territory west of the Rhine went along very smoothly. The Allies were hailed as deliverers in Belgium, Luxemburg and especially in Alsace-Lorraine, which was triumphantly entered by French forces. A similar entry was made into Brussels by King Albert and his Queen riding at the head of the Belgian troops. The British took over the administration of the zone around Cologne, the Americans that around Coblenz, and the French that around Mayence.

On Dec. 14, 1918, the terms of the Armistice were renewed until Jan. 17, 1919. During this period the conditions that were unfulfilled were to be completed. The following provision was also added to the general terms: "The Allied High Command reserves the right to begin, meanwhile, if it thinks it wise in order to ensure new guarantees, to occupy the neutral zone on the right bank of the Rhine to the north of the bridgehead of Cologne, up to the Dutch frontier. This occupation will be announced by the Allied High Command by giving six days' notice." Subsequent renewals of the Armistice terms occurred during the time that the Peace Conference was holding its meetings at Paris.

THE EASTERN FRONT

The early advance of the Russian armies into East Prussia in August, 1914, seriously affected the German invasion of France and almost upset the entire German plan. Von Hindenburg, however, frustrated the attempt of the Russians to overrun East Prussia by his victory at Tannenberg. Meanwhile the Russian armies advanced victoriously into Galicia and soon were well on their way to Cracow and into the passes of the Carpathians. To relieve the pressure on the Austrians, German Headquarters organized a counteroffensive through West Poland, which ended in a deadlock in the winter of 1914–15 with the opposing armies intrenched. In the spring of 1915, the Central Powers began a great offensive and by September of that year the Russians were driven out of Poland and Courland. This front then remained stabilized until May, 1916, when the Russians opened a successful campaign against the Austrian front to relieve the pressure of the Austrians in Italy. This success was followed by the Russian Revolution which ultimately prevented that country from being a further factor in the War.

The detailed account of the military operations falls under the following head: (1) Russian invasion of East Prussia terminating in the battle of Tannenberg and the first battle of the Masurian lakes; (2) Russian invasion of Galicia; (3) German operations in West Poland; (4) second battle of the Masurian lakes; (5) Austro-German drive in Galicia; (6) great Austro-German drive in the east; (7) Russian offensive in 1916; (8) military operations during the Kerensky government; (9) military operations during the Bolshevik government to the end of the War.

The struggle on the Eastern front was conditioned by a number of circumstances. First the German plan, which was based on a decisive victory in France before the Russians could get ready; few troops were therefore to be left to guard the east front. Next was the unexpected promptness of the Russian mobilization and concentration. Lastly and of paramount importance was the configuration of the frontier itself and its organization in view of war. The striking feature of the configuration was that Russian Poland projected like a huge bastion 200 miles deep between East Prussia on the north and Gâlicia on the south and that the political frontier separating the belligerant states was in no sense a military frontier. The Russian base of operations against East Prussia and the line of defense to which the armies could retire in case of defeat was that formed by the Niemen River between Kovno and Grodno and the Narew River with its principal tributary, the Bohr, from Grodno to the mouth of the Narew. On the Niemen were the fortified bridgeheads of Kovno, Olita and Grodno where railways crossed the river. On the Narew and Bohr were the fortified bridgeheads of Osowiec, Lomza, Ostrolenka, Rozan, Pultusk, Sierok, and at the junction of the Narew and Vistula the great fortress bridgehead of Novogeorgievsk. The German base of operations in the north was the Vistula River between the fortresses of Danzig and Thorn. Along this stretch of river there were a number of fortified bridgeheads. The province of East Prussia lay in advance of this line and for its defense the Germans had to rely on active defense by troops based on their complete network of railways and roads. The Masurian lakes near the frontier formed a north and south natural barrier about 40 miles long and the fortress of Königsberg was a strong point of support for military operations.

The Russian base of operations in Central Poland was the Vistula River from Novogeorgievsk to the Austrian frontier; along this stretch of river were the great fortified bridgeheads of Warsaw and Ivangorod. The German frontier from the Vistula to the Austrian frontier was an open one but parellel to it were a number of excellent railways for active defense.

From the Vistula to the frontier of Rumania the Austro-Russian frontier was an open one and for its defense both countries had to rely on active operations of their armies. The military frontier of Austria was the Carpathian range of mountains in rear of its border provinces of Galicia and Bukovina. Against invasion from the east, Austria could hardly hope to hold the entire province of Galicia, so her military authorities had constructed a barrier line from the Vistula to the Carpathians along the San River. On this river there were the fortified bridgeheads of Jarislau, Radymo and the great fortress of Przemysl.

In accordance with the Allied plan, the Russian armies were to assume the offensive as soon


WAR AREA
OF
EASTERN EUROPE
SCALE OF STATUTE MILES
0 20 40 60 80 100 120
SCALE OF KILOMETERS
0 10 20 30 40 50 60
Railroads
Canals
BALTIC SEA
GULF OF RIGA
GOTLAND
ÖLAND
Libau
Riga
Königsberg
Gulf of Danzig
Danzig
EAST PRUSSIA
Allenstein
Osterode
Soldau
Mlawa
Lomza
Bialystok
Grodno
Suwalki
Kovno
Vilna
Minsk
Pinsk
Brest-Litowski
WARSAW
Siedlce
Lodz
Radom
Kielce
Lublin
Sandomir
Czenstochowa
Breslau
Oppeln
Ratibor
Mahr-Ostrau
Brunn
Pressburg
Vienna
AUSTRIA
HUNGARY
GALICIA
Lemberg
Przemysl
Stryj
Tarnopol
Czernowitz
BUKOWINA
Buda-Pest
Debreczen
Danube R.
Vistula R.
Bug R.
Pripet
Dniester R.
Dwina R.
Niemen R.
Narew R.
San R.
Theiss R.
Pokov Lake
Lyser Ort
Dome Ness
Windau
Libau
Memel
Tilsit
Insterburg
Gumbinnen
Lyck
Ostrolenka
Pultusk
Plock
Thorn
Graudenz
Marienburg
Elbing
Bromberg
Posen
Kalisch
Lodz
Petrikau
Warthe R.
Pilica R.
Vistula R.
Bug R.
Narew R.
Niemen R.
Dwina R.
Pripet
Dniester R.
San R.
Theiss R.
Danube R.
Gulf of Danzig
Kurisches Haff
Frisches Haff
Pillau
Libau
Windau
Riga
Dünaburg
Pinsk
Brest-Litowski
Kovno
Vilna
Grodno
Bialystok
Suwalki
Allenstein
Osterode
Soldau
Mlawa
Lomza
Ostrolenka
Pultusk
Plock
Thorn
Graudenz
Marienburg
Elbing
Bromberg
Posen
Kalisch
Lodz
Petrikau
Radom
Kielce
Lublin
Sandomir
Czenstochowa
Breslau
Oppeln
Ratibor
Mahr-Ostrau
Brunn
Pressburg
Vienna
Lemberg
Przemysl
Stryj
Tarnopol
Czernowitz
BUKOWINA
Buda-Pest
Debreczen
Danube R.
Vistula R.
Bug R.
Pripet
Dniester R.
Dwina R.
Niemen R.
Narew R.
San R.
Theiss R.
Pokov Lake
Lyser Ort
Dome Ness
Windau
Libau
Memel
Tilsit
Insterburg
Gumbinnen
Lyck

as possible. The aim of their first campaigns was to drive the Germans out of East Prussia and the Austrians out of Galicia and Bukovina in preparation for an advance from West Poland For these campaigns they immediately organized six great armies, two for the invasion of East Prussia and four for the invasion of Galicia. The Russian commander-in-chief was the Grand Duke Nicholas.

Russian Invasion of East Prussia. For the defense of East Prussia, German Headquarters left in the east of the active army only three army corps and a cavalry division. There were mobilized in addition two reserve corps and the local Landwehr and Landsturm troops. These troops formed the VIII army—von Brittwitz—and also furnished the garrisons for the fortified bridgeheads on the Vistula and the garrison of the fortress of Konigsberg. As the Russians would probably invade East Prussia both north of the Masurian lakes from the direction of Kovno and south of the lakes from the Narew River, the VIII army was divided into two separate wings; the left wing, consisting of two active corps and three reserve divisions with the cavalry division, was to guard the frontier north of the lakes, while a single active corps with Landwehr troops was to guard the frontier south and west of the lakes.

In August, 1914, Russian Headquarters organized two armies for the invasion of East Prussia. The I army—Rennencamp—was to advance from the Niemen River between Kovno and Grodno and advance along the Kovno-Konigsberg railway north of the Masurian lakes. The II army—Samsanoff—was to advance from the Narew River with its left resting on the Warsaw-Danzig railway and its right passing the south end of the Masurian lakes. Contact between the two armies was to be secured after passing the lakes. Rennencamp was the first to reach the frontier, August 17, just as the German armies in the west began their advance; here he encountered the advance posts of the left wing of the VIII army. For a week there was constant fighting in which the weaker German force was steadily pushed back and on August 24 Rennencamp reached the line of the lakes and Insterburg. Instead of pushing on westward he apparently halted here to await the arrival of Samsanoff to protect his left and in the meantime his cavalry sought the right flank of the II army and reconnoitred along his front. Samsanoff reached the frontier several days later, August 22, and easily dispersed the weak detachments in his front. His centre now moved on Allenstein while his right moved northward to seek contact with Rennencamp.

On August 22 the situation seemed very serious to the commander of the VIII German army, who found both wings in retreat, and although he made preparations to concentrate on Samsanoff, he informed German Headquarters at Coblenz that he might be compelled to retire behind the Vistula. At this stage Headquarters decided to intrust the command of the VIII army to von Hindenburg, a retired general who was thoroughly conversant with the topography of East Prussia, and sent to him as his chief of staff von Ludendorff, a staff officer of the II army who had shown great initiative in the capture of the town and bridges of Liége. Von Hindenburg took command on August 23 and found the situation as above stated. The two Russian armies were still separated and his only chance for success was to decisively defeat one of them before they could unite. Calling from the nearby fortresses all their available troops, he succeeded in raising his army to five and one-half corps, which was nearly that of the II Russian army. His plan was a bold one for he proposed to leave but a mere screen in front of Rennencamp and employ his entire force against Samsanoff. In order to make his victory decisive, if possible, he proposed to envelop both wings of the II Russian army. His predecessor had already made this possible by moving a corps from the extreme left of his army to the extreme right by rail. It took several days to get the troops in position but by the 27th all was ready for the attack. Two and one-half corps were in front of Allenstein to check the advance of Samsanoff's centre, consisting of three corps; two corps had withdrawn from Rennencamp's front and were ready to move southward in rear of the lakes on Samsanoff's rear protected by a single corps, and one corps was ready to turn Samsanoff's left protected by a single corps. Fortunately for Hindenburg, Rennencamp made no attempt to advance and his cavalry failed to penetrate the German screen to discover what was going on in its rear.

The battle of Tannenberg, as it was called, began on the morning of August 27 and lasted three days. Samsanoff was found dead on the field and two of his corps commanders with 90,000 men were captured Three of his corps were practically annihilated and the others escaped only with severe losses. The battle was named in honor of one of the same name fought there in 1409 between the German Knights and the allied Poles and Lithuanians. As the I and II Russian armies were advancing into East Prussia, Russian Headquarters began the organization of the X Army at Grodno to serve as a general reserve. Two corps of this army advanced across the frontier east of the Masurian lakes just in time to cover the retreat of the remnants of the II army.

After the battle of Tannenberg, von Hindenburg was reinforced by two army corps and a cavalry division from the Western front and made preparations to attack Rennencamp's army. His plan was to engage Rennencamp's front with his main force while his right wing moved south around the Masurian lakes to cut off the retreat of the Russian army. His right wing, however, unexpectedly encountered the X Russian army, which defeated his plan, and all he was able to accomplish was the retreat of the Russians across the frontier to the Niemen River. In these operations, which began September 7 and lasted about a week, the Germans claim to have taken 45,000 additional prisoners; they call the operations the first battle of the Masurian Lakes. While the situation on this front was still unstabilized, von Hindenburg was compelled to go to the assistance of the Austrians.

Russian Invasion of Galicia. The German plan, as we have seen, contemplated the crushing of France, while Russia should be held by the Central Powers. In form, so far as Austria was concerned, the holding was to begin by an invasion of Russian Poland. South of the frontier two railways run roughly parallel to the boundary, and from these two ran branch lines and feeders. The Russians were not nearly so well off in the matter of transportation. Given, therefore, the supposed slowness of Russia's mobilization and the poverty of her rail system,

an invasion of Russian Poland seemed to be a promising undertaking.

According to the plan of attack drawn up by the chief of staff, Gen. Conrad von Hotzendorff, the invasion was to be made by two armies. The I army under General Dankl concentrated on the lower San River was to advance northward east of the Vistula to seize the railway junction of Lublin; its left was protected by a detachment, largely cavalry, which was to operate west of the Vistula and then cross that river. Its right was protected by the IV army —Auffenberg—which was concentrated at Jaroslav and was to advance northward to the railway junction of Cholm. The III army—Brudermann—was concentrated east of Lemberg and was to defend the frontier between the Bug and Dniester Rivers. The II army was on the Serbian frontier but had one corps in Galicia which was to guard the frontier south of the Dniester River and coöperate with the III army.

The Russian mobilization against Austria was begun a week before that against Germany and in the month that elapsed before actual hostilities the armies were concentrated for active operations In southern Poland between the Vistula and Bug Rivers was an army group consisting of the IV and V Russian armies under General Ewart. On the eastern frontier of Galicia between the Bug and Dniester Rivers were the III Russian army—Russky—and the VIII Russian army—Brusiloff—forming a group under Ivanoff. South of the Dniester River were detachments of the VII Russian army on the frontier of Bukovina. Each of the four principal armies was stronger than any of the three Austrian armies.

On August 25, well south of Lublin and Cholm, the two Austrian armies encountered such strong resistance that they were unable to advance as the IV and V Russian armies were in their front. On August 22 the great Russian advance of the III and VIII armies began and the VII invaded Bukovina The Austrians were unable to offer any adequate resistance and the Russians advanced triumphantly and occupied Lemberg on September 3. To stem the Russian tide, Austrian Headquarters recalled the remaining corps of the II army from Serbia and with the II, III and IV armies took up the position of Rawaruska-Grodek west of Lemberg facing east. Here was fought a battle, September 7–11, on the same days that Hindenburg was attacking Rennencamp in the north and the battle of the Marne was in progress in the west. The Austrians were defeated and retired to the San River where the I Austrian army was compelled to join them. The Russians now pushed on, crossed the San River and invested the fortress of Przemysl. South of the Dniester they occupied Bukovina, took possession of the passes in the Carpathians and their cavalry was advancing into Hungary. Such was the situation when Austrian Headquarters called on the Germans for help and von Hindenburg was sent from East Prussia to Silesia to take command there and organize a new army.

German Operations in West Poland. In order to create the IX German army in Silesia, von Hindenburg was compelled to withdraw four of his corps from East Prussia and replace them as far as possible with Landwehr and newly organized units. When he reached Silesia, von Hindenburg learned that there were few Russian troops in Poland west of the Vistula River; with the Austrian chief of staff he decided on the plan of operations. The IX German army with the I Austrian army on its right were to advance eastward to the north of the Vistula thus turning the flank of the Russians in Galicia, so that they would be obliged to cease their pressure on the Austrians south of the Vistula to meet this threat. The IV, III and II Austrian armies were then to advance as soon as possible and relieve the fortress of Przemysl; the IV army from the west and the III and II over the Carpathian mountains.

The IX German army began its advance in the latter part of September and soon the effects of the movement were seen in the shifting of the Russian troops These fell back across the San River and the IV and V armies began a movement up the east side of the Vistula River The IX German and the I Austrian armies reached the Vistula without much opposition and eventually the I Austrian army took up the front from Ivangorod to the San while the IX German army extended its flank northward to Warsaw. They were, however, unable to capture the bridgehead of Ivangorod or that of Warsaw, so the Russians still had access to the west bank. In Warsaw the Russians had begun the formation of their IX army. Due to the shifting of the Russian troops, the Austrians were able to get supplies into Prezemysl but that was all; their armies were unable to cross the San River.

When the Russians began to shift their troops, the command of those left in Galicia was given to Ivanoff and those assigned to operate in West Poland to Russky. By the 20th of October, Russky felt strong enough to engage his adversaries west of the Vistula and the Russians advanced once more, this time on the whole front from Kovno to the Carpathians. In East Prussia, the German VIII army was compelled to retire across the frontier to an intrenched line which ran from the Masurian Lakes to the Niemen River Von Hindenburg was unable to offer adequate resistance in West Poland and with the I Austrian army retired about 200 miles back across the frontier into Posen and Silesia. To delay the Russian advance he destroyed the railways that his troops had just repaired. In Galicia the Austrians retired to the vicinity of Tarnow and over the Carpathians leaving the garrison of Przemysl to its fate.

On November 1 the situation of the Central Powers on the Eastern front was apparently desperate, as the German armies in the west were engaged in the desperate battle of Flanders and could not afford to send infantry to the east; most of the cavalry had already been sent to the VIII and IX armies. Von Hindenburg was now placed in command of both the VIII and IX armies and von Mackensen was placed in command of the IX army.

Realizing that he was not strong enough to meet the Russians at all points of their front, von Hindenburg decided to concentrate the IX army for a flank attack. He therefore had it railed to the frontier between the Vistula and Warta Rivers where it could advance with one flank protected by the Vistula. The defense of the frontier from the Warta southward was left to Landwehr and local troops assisted by the I Austrian army. They were to advance if his attack was successful.

On November 11 he was ready to strike; at this time the Russians were already near the

frontier all the way from the Vistula to Cracow and some of their cavalry had actually crossed it. The IX German army drove back the right wing of Russky's armies between the Niemen and the Warta and the endeavor of the Russians to check the advance resulted in more or less confusion along their entire front. Ewart now took command of the left wing of these armies while Russky remained in command on the right. The operations in West Poland continued from week to week and ended only about the close of the year. They ended with the opposing armies intrenched along the Bzura, Rawa and Nida Rivers. The most important engagement was the battle of Lodz, in which, in attempting to envelop the flank of the Russian armies, three German divisions and two cavalry divisions were suddenly cut off from the remainder of the IX army and for two days were surrounded by Russians. According to German reports they finally emerged with 10,000 prisoners. In Galicia the Austrians were driven behind the Dunajec River and lost nearly all the important passes in the Carpathians. After operations closed in November on the Western front, a number of corps were sent from there to West Poland in the hope that the Russians might be forced behind the Vistula River. By the time of their arrival the Russians were already intrenched and the desperate attempts made to dislodge them resulted only in tremendous losses in the attacking German troops.

At the close of the year the combatant troops on the Eastern front, as given by the German chief of staff, were as follows:

	Germans	Austrians	Total	Russians
On the East Prussian frontier	105,000	. . . .	105,000	320,000
West Poland	385,000	140,000	525,000	847,000
Galicia and Bukovina	12,000	513,000	525,000	521,000

A German division was assisting the Austrians in the Carpathian passes.

1915. Second Battle of the Masurian Lakes. At the close of 1914, as previously stated, the Russians again occupied East Prussia as far west as a north and south line through the Masurian Lakes. This force was the X Russian army—Sievers—as the I Russian army was now along the frontier between the lakes and the Vistula. German Headquarters decided to take advantage of the cessation of hostilities on other fronts and by a winter campaign drive the Russians across the frontier and if possible across the Niemen and Narew Rivers. For this purpose several new divisions were sent to von Hindenburg and he formed the X German army —von Eichorn—to operate to the left of the VIII army. As at Tannenberg, von Hindenburg planned to envelop both flanks of the X Russian army by attacking close to the Niemen in the north and south of the lakes. The Russians were in winter quarters and not expecting attack when it suddenly developed February 7 and was executed under severe weather conditions with frequent snow storms. The campaign lasted two weeks and ended with the capture of 100,000 Russians, including a corps and three division commanders and some 300 guns. The Germans attempted to capture the fortress of Ossoviec but were repulsed. The operations were extended to cover the front of the I Russian army but met with little success. Russky, who had been in command of the Russian right which included the X army, was now relieved by Alexieff.

In Galicia, during the winter, the IV Austrian and the III Russian armies faced each other between the Vistula and Carpathians while the II and III Austrian and VIII Russian armies faced each other on the crest of the Carpathians. The XI Russian army was besieging Przemysl. German divisions had been sent to reinforce the Austrians in the mountains to recapture the passes but the winter operations there were of no avail. In March, Przemysl surrendered and its besieging army reinforced the VIII Russian army. In Bukovina the VII Austrian army was engaged with the VII Russian army.

In the spring of 1915 the situation on the Eastern front was very unsatisfactory to German Headquarters. The Austrian armies were discouraged and from the crests of the Carpathians the Russians threatened an invasion of Hungary. The government of Italy was wavering and at any moment Austria might be called upon to meet a new enemy. It was therefore decided to attempt a blow that would compel the Russians to retreat from the mountains. For this purpose a new army, the German XI army, was organized behind the IV Austrian army; this was made up of picked corps from the Western front and was well supplied with heavy artillery. Von Mackensen, who had successfully commanded the IX army, was assigned to its command and the IV Austrian army as well as the Austrian and German troops in the Carpathians were directed to coöperate with him. This new army quietly replaced the troops of the IV Austrian army in the southern sector between the Vistula and the Carpathians. If the XI German army could break through the left wing of the III Russian army and advance at the foot of the mountains, the Russians in the passes would have to retreat or risk the danger of capture. Once the passes were freed, the Austrian and German troops in their rear could advance to the plain and take part in the general drive. It should be stated that the Russian intrenched lines were by no means so strong as the intrenched lines on the Western front.

Austro-German Drive in Galicia. A terrific cannonade began along Mackensen's front on the afternoon of May 1 and continued through the night to prevent the Russians from repairing damages. On the 2d it began at daylight and lasted four hours, when the infantry attack was launched. The Russian front was shattered and although here and there the Russians offered stubborn resistance the tide swept on and one by one the Carpathian passes were evacuated and the Austro-German forces in their rear moved down to swell the forces in the plain. By May 15 the San was reached, where the advance was temporarily halted to repair the railways, bring up supplies and heavy artillery, relieve some of the corps engaged in the first movement, and secure both banks of the river for a further advance. It was at this time that Italy declared war and a part of the I Austrian army was sent there to reinforce the V and VI armies from the Serbian front. On June 2, Przemysl was evacuated by the Russians and by the middle of June the Austro-German armies were ready for another advance. In the meantime the Russians had taken up a defensive position on the Rawaruska line, where they had defeated the

Austrians in 1914. This line was forced on June 18 and on June 22 one of the Austrian armies occupied Lemberg.

From the San River the IV Austrian and XI German armies had turned northward and advanced with the left flank resting on the Vistula but at the frontier they were stopped. The Russian armies in West Poland had retired to the vicinity of the Vistula and had concentrated a strong force in their front. To reduce this resistance it became necessary to strike another blow at some other point of the Russian front. Operations had already been begun in the extreme north where the German Baltic army, largely cavalry, had crossed the Niemen River in April and now occupied the line of the Libau-Kovno railway. On July 2 there was a conference between von Falkenhayn, chief of staff of the German armies, and von Hindenburg to determine the new point of attack. Von Hindenburg recommended that this attack be made in the direction of Kovno and thus threaten the main lines of communication of the Russians which ran through Vilna and its vicinity. A successful drive here would compel the Russians to retreat toward the Pripet marshes. Falkenhayn, however, considered this plan too ambitious and was content with forcing the Russians to evacuate the line of the Vistula. Upon his recommendation, therefore, the attack was to be delivered along the Narew River; here a successful drive would compel the Russians to evacuate Warsaw but would leave their lines of retreat open.

The Great Austro-German Drive in the East. For the opening attack of the great drive which was to extend from the Baltic on the north to Rumania on the south a new XII army—von Gallwitz—was formed on the left of the VIII army, whose mission was to force the crossing of the Narew River. The attack opened on July 13 but it was only 10 days later that the Germans by the capture of the bridgeheads Ostralenka, Rozan, and Pultusk were able to cross the Narew in force. It was immediately followed by the complete withdrawal of the Russian forces from West Poland across the Vistula River and the beginning of the general retreat. Ivangorod was evacuated on August 4 and Warsaw on the following day. In Novogeorgievsk the Russians left a garrison of 80,000 men but under the fire of heavy artillery it fell in a few days and its garrison surrendered. The retreat of the Russians was followed by an advance of the Austro-German forces along the entire front. In the south the Austro-German Carpathian armies moved eastward from Lemberg and into Bukovina; farther north von Mackensen with his two armies advanced to the Bug River, where the Russians evacuated the fortress of Brest-Litovsk, August 25, and fell back to the Pinsk marshes, the Austro-German forces in West Poland crossed the Vistula and reinforced the XII army; the VIII army forced the crossing of the Narew and Bohr Rivers and captured the bridgehead of Lomza, August 10, and that of Ossoviec, August 22; the X army advanced against the fortress of Kovno on the Niemen, captured it on August 17, and the great railway junction at Vilna a month later; in the extreme north the German Baltic army captured Mitau and reached the Dwina River between Riga and Dwinsk or Dunaberg

About the middle of September active operations ceased and the Eastern front became stabilized. The new front followed the Dwina River from Riga to Dwinsk then ran almost due south to the Dniester River; the Russians still occupied a small section of eastern Galicia. While the Germans had possession of all the frontier fortresses of Russia and had seriously injured the morale and the fighting ability of the Russian armies, they had not been able to force a decision on the Eastern front because of their failure to prevent the retreat of the Russian armies. It was during the Russian retreat on September 5 that the Grand Duke Nicholas was relieved from the command of the Russian armies and sent to command the Russian forces on the Turkish front; the Czar took command of the armies with Alexieff as chief-of-staff and Russky again commanded the northern group.

Year of 1916. After the cessation of operations in the autumn of 1915 and during the following winter the Russians made strenuous efforts to reorganize and equip their armies. In this they were considerably handicapped by a corrupt and inefficient war department and by their inability to receive munitions from their allies and neutrals. During the winter supplies from the outside could only be received through ports on the Pacific where terminal facilities were inadequate and over a long line of railway with limited rolling stock in poor condition as a result of the War. In the spring, Kuropatkin, who had been in command of the Russian armies in the Russo-Japanese War, was assigned to the command of the northern group, and Brusiloff to the southern group. Ivanoff was assigned to duty at headquarters. Ewart remained in command of the central group.

The military situation on the Russian front was improved during the autumn, winter, and spring by the withdrawal of German and Austrian troops, first for the drive in Serbia, then the attack on Verdun and lastly by the Austrian drive in Italy. At this time the northern and central groups of Russian armies, which extended from Riga to the Pripet marshes, were facing the Baltic, X, VIII, and XII German armies under von Hindenburg and the central group under Prince Leopold of Bavaria, consisting of the IX German army with some Austrian troops which prolonged the line to the marshes. The southern Russian group was opposed mainly by Austrian troops; in the centre was an Austro-German army under German command.

When the German Crown Prince opened his tremendous assault on Verdun in February the Russians were requested to attack the Germans to relieve the pressure on the Western front and to prevent the sending of German troops to the Western theatre. Attacks were consequently made at various points. The main attack was made by two armies of the central group east of Vilna in March. Severe fighting followed, but did not change the position of the lines, although the object was probably accomplished. While they were unable to assume the offensive, the Germans had strongly organized their lines, as they desired to hold all the territory gained in order to draw from it supplies; the Allied blockade had cut them off from supplies through neutral states. Minor attacks were made on this front during the year but without material results.

Brusiloff's Offensive. Brusiloff whose front extended from the Pripet Marshes to Rumania had under his command four armies and was later reinforced by a fifth from the central

group. When called on in May to assist the Italians by a counterattack in the east he was ready to act. At this time, the Russians had on the east front about 140 divisions of infantry and 33 divisions of cavalry, probably depleted in strength. From the railway junction of Rovno, then held by the Russians, two railways run westward, one to the northwest to the railway junction of Kovel where the line forks toward Warsaw and Brest-Litovsk and the other to the southeast toward Lemberg crossing the Galician frontier at Brody. It was along these two railways that Brusiloff planned attacks by his right wing, consisting of two armies with Kovel and Brody as objectives. Farther south one army was to attack on each side of the Dniester River.

The attack began on May 4; that same day the Austrian line in front of his right wing was broken and two days later the Russians had captured Lusk, several miles in rear of the Austrian front. The two Russian armies now advanced and at the end of two weeks had advanced about 40 miles on a front of 80. In the meantime, German troops were sent from the north, and succeeded in checking the advance. A fifth Russian army was now deployed on the right of the others but was unable to make any headway; the objective, Kovel, could not be reached. The attack north of the Dniester was repulsed and it was only in the latter part of July, when Brusiloff captured Brody and threatened the flank of the Austro-German army on this front, that it fell back to a new position 15 miles in the rear, from which it could not be dislodged. South of Dniester, the Russians recaptured Bukovina and advanced as far as they could safely go while the Austro-Germans still held the north bank. About the middle of August the Russian operations ceased on this front, as Rumania was about to declare war and Brusiloff was directed to send troops to her aid.

Although he had effected no material change on the Eastern front, Brusiloff had caused Austrian troops to be withdrawn from Italy where they had begun an offensive campaign and thus permitted the Italians to go on with their own offensive operations, and he probably also encouraged the Rumanians to declare war. Had the Russian armies in the north coöperated with him, possibly greater results might have been attained.

Year of 1917. The operations on the Russian front were greatly influenced by the political changes during the year. In March the reactionary government of the Czar was overthrown and a provisional government established under Kerensky. In November the Kerensky government was overthrown and the Bolsheviks came into power under the leadership of Lenine and Trotsky. For the details of the Russian Revolution see RUSSIA, *History*. Previous to the fall of the Czar's government there was an unsuccessful offensive attempted on the Aa River in the Riga district, the prime object of which was to relieve the tremendous pressure on Rumania.

Military Operations During the Kerensky Government. After the breakdown of the Russian offensive on the Aa River, the Russian front was comparatively quiet until the Russian Revolution was well under way. The situation on the entire front was deplorable. Discipline had completely broken down. Generals were appointed and removed or they resigned. The orders issued by the officers had to be approved by the men themselves. Fraternization between the Russian and German soldiers was carried on to a large extent and could not be checked. The situation could not have been much worse. As a result of this demoralization, the Germans and Austrians were able to remove several divisions from the Russian front for use on other fronts. What fighting was done was spasmodic and of a local character. The Allies looked on the revolution at first with favor as they thought it would result in a more vigorous prosecution of the War but they soon discovered that it really resulted from war weariness. The Kerensky government was urged to renew hostilities but it was not until the middle of the year that operations could be renewed. Even then there was little hope that anything could be accomplished by the northern armies as they had been influenced by German propaganda and by the events in the capital.

Brusiloff, who was now commander-in-chief, therefore decided to assume the offensive with his old armies, now commanded by Guter on the Austrian front, as these armies had been less affected by the revolution than those in the north. The northern armies were to coöperate in the general advance but it is doubtful if he expected much from them.

The operations of the southern armies began on July 1 and, as in the preceding year, the Russian armies swept all before them for about two weeks and advanced about 30 miles on a front of 100. This attack compelled German Headquarters to bring some of their best shock troops from the Western front. The counterattack of these troops was made against the left flank of the Russian group of armies July 19 and it was at once discovered that the Russians were no longer the disciplined troops of the previous years. The left army was routed, and as disintegration began in the other three, all the armies retired across the frontier and for the first time since the beginning of the War there were no Russian troops in Galicia. The northern Russian armies made some isolated attacks but without success.

In August, in the extreme north, the Germans captured the port of Riga which had resisted all their efforts of the preceding year. This was followed by the occupation of the islands at the mouth of the Gulf of Riga and the landing of troops on the coast of Esthonia to the east in preparation for an advance on Petrograd if necessary. However, the Kerensky government was replaced by that of the Bolshevist government in November and an armistice was declared between the new government and the Central Powers early in December. Military operations on the Russian front now ceased as the armistice was later followed by the treaty of Brest-Litovsk (see RUSSIA).

Military Operations Under Bolshevist Government Until Nov. 11, 1918. After the Bolshevists had made peace with the Central Powers, their attempts to pacify that part of Russia which remained in their hands were rather unsuccessful. A considerable army of Czecho-Slovaks was roaming around the central part of Russia, attempting to reach Vladivostok and then join the allies in order to down their hereditary enemies, the Austrians. These men had deserted from the forces of the Central

Powers or had been taken prisoners and had later fought with the Russians. After Brest-Litovsk they received permission to cross Siberia. For some time their relations with the Bolsheviks were very friendly, then Moscow ordered them disarmed; the Czecho-Slovaks resisted and conflicts occurred between them and the Soviet forces. The first battles began in May and continued throughout 1918.

When it became known that the treaties of peace between Germany on the one hand and Finland, Russia, Rumania, and the Ukraine, on the other, were to be used by Germany as a means for making these countries subservient to Germany, the Allies determined upon a certain amount of military intervention in order to try to save something from the chaos that existed in Russia. The Allies seized the region around the Murman coast, with the cities of Murmansk, Kola, and Kem (July, 1918). The purpose of this was primarily to prevent the Germans from capturing the supplies that the Allies had landed at the Arctic terminus to the Murman railway completed during the War. The Americans furnished a small force for this expedition.

In July, 1918, it was also announced that the Allies after a long period of consultation had determined to send a combined force of men to Vladivostok to aid the Czechs as far as possible, and also to attempt to break up the armed bands of Austrian and German prisoners who were the main part of the Bolshevik forces. Therefore 10,000 Americans, 10,000 Japanese, and smaller numbers of French and British were placed under the command of General Otani (Japanese), and despatched to Vladivostok in August. Maj.-Gen. William S. Graves was placed in command of the American troops. For further details see SIBERIA.

ITALIAN FRONT

Italy's entrance into the war in May, 1915, which the Allies hoped would relieve the pressure on Russia, had two main movements: (1) to the north, to close the passes of the Alps against invasion; (2) to the northeast, to cross the Isonzo and take Trieste. The Isonzo line was reached, but the operation was not completed. An Austrian invasion from the north (May, 1916) was checked mainly by an opportune Russian drive into Galicia. After a successful attack against Austria the Italians were compelled to beat a precipitous retreat to the Piave in 1917. From there they organized the blow that crushed Austria in 1918.

Year of 1915. As a result of an agreement between Great Britain, France, and Italy, known as the Pact of London, Italy declared war on Austria, May 23, 1915. The Italian army on a peace footing consisted of 12 army corps or 25 infantry divisions, which at war strength without reserves would give an army of about 375,000 men. The division consisted of two brigades of infantry, about 12,000 men, and one regiment of field artillery with 30 guns. Each regiment of infantry had a section of two machine guns. The cavalry consisted of 29 regiments which were to furnish the corps cavalry and independent cavalry divisions. Of heavy artillery there were four regiments of four batteries each, equipped with 6-inch howitzers which were to be assigned to armies. The Italian army entered the campaign with an insufficient equipment of artillery, which was gradually increased in the course of the War.

The work before the Italians was simple in respect of conception, difficult in point of execution. The configuration of the frontier at once fixed the nature of the task. It was absolutely essential to close the passes of the Alps from Switzerland eastward in order to protect the flank and rear of their armies on the Isonzo line and to prevent invasion of Italy from the Trentino. This condition secured, the task of the remainder of the forces was to cross the Isonzo, for it must not be forgotten that Italy's material objective was Trieste with the Istrian Peninsula.

Four armies took the field, two on each frontier, the northern and eastern. A fifth force, composed of Bersaglieri and Alpini, was designated for operations in the Carnic Alps. Gen. Count Luigi Cadorna, the chief of the general staff, was in general command, although the armies were under the nominal leadership of the King. On May 24 the frontier of the Trentino was crossed and two weeks later the road to Verona was closed. During the opening days of the campaign in this region the Austrians had opposed but slight resistance to the forward movement of the Italians because of the events on the Eastern front. Farther west the Italians closed the gateways opening southward into the valley of the Tagliamento after severe fighting. In the Trentino as a whole the Italians managed to get control of most of the roads leading into their own country.

The nature of events on the eastern frontier was almost wholly determined by the obstacle forming the line of separation between the contending armies, i.e. the Isonzo River From its left (Austrian) bank rises ridge upon ridge, whereas the right bank from which the attack must come, below Gorizia, is flat, the Friuli plain. In crossing the river here, therefore, the Italians would be compelled to fight uphill. The rectangle Gorizia-Gradisca-Trieste-San Daniele is occupied by the Carso plateau, with hills from 150 to 1700 feet high. This plateau would have to be taken, or at least a passage opened through it, before Trieste could be reached. On May 24, Italian troops occupied various small towns just across the frontier. Their troubles began when they undertook to cross the Isonzo, for soon after reaching it they found it in flood. Their difficulties were increased by the failure of the cavalry to seize the bridges at Pieris A dash for these bridges would have insured a crossing and might have gained possession of a part at least of the Carso plateau. As it was, the Austrians blew up the bridges before any Italians got across. The flood subsiding on June 5, a crossing was made at Pieris, and Monfalcone occupied. But now a fresh obstacle presented itself; the Austrians flooded the low country at the foot of the Carso plateau. The advance was thus blocked, and operations along the entire line delayed. After three unsuccessful attempts to make another crossing of the river just above Sagrado, the Italians finally succeeded on June 24. By the 27th they had obtained a bridgehead on the Isonzo and a line of advance to the Carso plateau. This formed part of a general struggle over the whole line from Plezzo to the sea. The conflict was necessarily intensified at certain points, such as Gorizia, Plava, and Tolmino.

Gorizia lies in a bend of the river, and is

dominated by the hills behind it stretching away into the general mountain system. On the west bank, Monte Sabotino, itself commanded by the hills on the eastern bank, likewise controls the position; from Sabotino run the Podgora heights well below (south of) Gorizia. Between Podgora and Gorizia is open ground 3 miles wide, bounded on the southeast by the river. Sabotino and Podgora, thoroughly organized defensively by the Austrians, were unsuccessfully attacked by the Italians at the end of May. They were slightly more successful at Plava On the 17th of June, after heavy fighting, they gained the summit of the hill controlling this town. They held the hill thereafter in spite of the efforts of the Austrians to win it back, but were unable to extend their holdings on the left bank. At Tolmino the river turns 90 degrees from southeast to southwest. In the bend stand two hills joined by a saddle, Santa Maria and Santa Lucia. These were held by the Austrians, and formed with Sabotino and Podgora the only positions retained by them on the west bank of the Isonzo. The resistance offered at Tolmino was more serious than apparently the Italians had expected. Their attempt to seize it by sudden attack failed, and they were compelled to proceed against the place by regular investment. In the meantime they were more fortunate to the northwest at Caporetto, which they had occupied on the first day of the War. By June 23, the Italians had succeeded in getting into positions from which they threatened the Plezzo valley. They now came down from the north against Tolmino. In August they attacked Santa Lucia and Santa Maria, but were compelled to resort to trench warfare. Later in October the offensive was resumed, without, however, succeeding in dispossessing the Austrians. At the end of the year the Italians had gained one of their points. They had closed the gates of the northern frontier, and held the keys On the other hand, they were unsuccessful on the Carso. A period of relative quiet then prevailed.

1916. Austrian Attack in the Trentino. The Austrian plans for 1916 contemplated an attack on the Italian front before the Italians recovered from their unsuccessful campaign of 1915. Inasmuch as they selected the Trentino front, which was largely mountainous, they were compelled to wait until May before beginning operations, so that the snow would have a chance to melt. During the winter and spring, the Austrians were concentrating troops in Trent, collecting them from the Russian and Serbian fronts, as well as from the interior. The advance was to be made over the mountains between Lake Garda in the west and the Brenta River in the east In this section there were a number of valleys which led to the crest of the mountain boundary and thence to the plains of Italy. The Austrian forces, which were concentrated, however, were entirely too weak to accomplish the object set before them and did little more than divert interest from the Isonzo front.

The front to be attacked was held by the 1st Italian army, which was ill prepared for modern warfare and which was led by an overconfident commander, who had taken little care to fortify his position, which he knew for months was going to be attacked. The attack began in the middle of May and was preceded by a heavy bombardment, which, being new to the Italian troops, had a very demoralizing effect upon them. The result was a slow but steady advance on the part of the Austrians. At the end of two weeks, Asiago and Arsiero had been captured. By this time the attack had exhausted itself and this fact, coupled with an attack by the southern group of Russian armies, forced the Austrians to begin to recall their troops. They fell back to a position intermediate between their advanced and original positions. No serious fighting followed this withdrawal, as the Italians returned to their attacks on the Isonzo front.

Operations on the Carso Plateau. While the Austrian attack was being carried on in Trentino, the Italian II and III armies continued their operations against the Austrian positions north and south of Gorizia. By August their work had produced results which made a successful assault feasible. The attack was delivered north and south of Gorizia on August 6 It was preceded by a bombardment of great intensity. By the 9th the Austrian first line had been broken and by the 12th they had been driven back 3 miles to their second position. Gorizia had been evacuated on the 9th. North of this town all the Austrian positions on the heights of Sabotino and Podgora west of the Isonzo were captured. During the remainder of the year attempts were made by the Italians to advance farther along the Carso plateau, but the Austrian lines proved too strong.

1917. Italian Spring and Summer Offensive. The winter on the Italian front was very severe and of long duration. The time was spent in increasing the entire military establishment on the front and in preparing to meet an Austrian attack on the Trentino front and in organizing an Italian attack on the southern part of the battle line. The plans of the Italian General Staff were as follows: First, to engage the enemy on the entire front from Tolmino to the sea in an intense artillery action which would leave him doubtful as to the real direction of the decisive attacks; then to attack along the Isonzo with the II and III armies. The II army was to seize the heights on the east bank of the Isonzo from Gorizia about 6 miles northward. When the Austrians concentrated here the III army was again to press forward in the main attack along the Carso plateau in the south.

Operations were begun on May 12, and on May 14, the infantry advanced from Plava and Gorizia. On the entire front the Austrians presented stubborn and determined resistance. The first phase of the assault lasted until May 22, by which time the Italians had captured the Austrian first line. The Austrian second line, however, was on heights which overlooked and dominated the first line. In order to create a diversion the Austrians unsuccessfully attacked in the Trentino region, May 19 to 22.

On May 23 the Italian infantry began the second phase of the battle. After tremendous artillery preparation, it attacked on the south edge of the Carso plateau from Castagnavizza to the sea. Over 100 aëroplanes aided in this battle. On the next day the battle was resumed and extended from Gorizia to the sea. Allied monitors bombarded the extremity of the Austrian lines with heavy naval guns. The Italians advanced in the face of exceedingly stubborn resistance—counterattacks, violent shelling, and aërial bombardments from machines

flying near the ground. The Italians advanced their lines about 2 miles, but had not accomplished all that was expected, inasmuch as the key position was 2 miles farther on from the new Italian front line.

The Austrians, on June 1, began an offensive which compelled the Italians to retire somewhat from their newly-won positions. On account of conditions in Russia they were able to bring up great quantities of men and material from the Eastern front On June 3, a general attack from Mount San Marco to the sea was begun and lasted with unabated intensity for three days. It was at first successful, driving the Italians back about 1¼ miles. A counterassault by General Cadorna in the Trentino compelled the Austrians to give up this offensive, which was supposed to neutralize the Italian gains in the latter part of May. During July and the first part of August the opposing forces battled back and forth in an attempt to get advantageous positions. On the night of August 18, the Italians began a spectacular offensive from Tolmino to the sea, a front of approximately 37 miles. The attack was made by the II army, under General Cappello, which operated on the Bainsizza plateau, Monte Santo, and Monte San Gabriele, and the III army under the Duke of Aosta, which operated in the Vippacco and Brestovizza valleys, and in front of Mount Hermada, the keypoint to the Carso plateau. These armies were aided by Italian and British monitors in the Gulf of Trieste.

The Italians paved the way for their advance by a great engineering feat. They had diverted the course of the waters of the Isonzo River from its bed above Anhovo and had built bridges across the shallow stream that remained. This work was done at night and at daylight the stream was rediverted to its regular channel. By means of these bridges and some pontoon bridges hastily constructed, the Italians crossed the river on the 18th and gained a foothold on the northern part of the Bainsizza plateau At the same time Cappello's right wing began to envelop Monte Santo. These two movements compelled the Austrians to retire to the easternmost edge of the Bainsizza plateau. From the nature of the Austrian defenses, it was quite apparent that the Austrian Staff thought this plateau impregnable On August 24, the Italians occupied the summit of Monte Santo, 2240 feet high, but attempts to reach the summit of Monte San Daniele were futile.

The Duke of Aosta had been busy in the south in the meanwhile His object was to surround the Hermada Mountains, which were the key to the Carso plateau and Trieste, and to occupy the Vippacco valley. He was unable to break through the Hermada Mountains, however, and spent the entire month in fruitless efforts

At the end of September, General Cadorna reported to his allies that his offensive of 1917 was ended. In the attacks north and south of Gorizia his losses in killed, wounded, and missing were 350,000; with losses due to sickness, his casualties were about 700,000. The II army especially suffered from the latter cause. It is probable that the Austrian losses were about as great, as they appealed to the German G. H. O. for assistance

Austro-German Counterattack and Italian Retreat. As has been described above, the main Italian army was striking on a comparatively limited front on the Bainsizza plateau. This attacking force was composed of seasoned veterans. The armies protecting its flanks were of unequal strength and were used for different purposes. Those on the upper Isonzo were Territorials, i.e. older men who in peace times are held in reserve They extended from Tolmino to Plezzo and were to protect the flank of the Bainsizza army. The troops on the lower Isonzo were veterans, who were thrusting forward on the Carso plateau *pari passu* with the troops on the Bainsizza and who were ultimately to march on Trieste

The German General Staff had been receiving calls for help for some time and at last gave heed to them, sending the XIV Germany army, consisting of six or seven divisions The strategy of the Austro-German plan was to strike at the unseasoned troops on the upper Isonzo, break through, and then cut the lines of communications of the other two armies by outflanking them. This plan was put into operation and worked exceedingly well. The task was made easier by the collapse of Russia, a superiority of artillery, surprise, socialistic propaganda, and cowardice, which General Cadorna claimed was exhibited by his troops on the upper Isonzo.

The battle began on October 24, with a bombardment of the Plezzo-Tolmino front and the northern flank of the Bainsizza plateau Under cover of these guns the Germans and Austrians broke through the front line trenches at Plezzo and Tolmino and crossed to the western bank of the Isonzo. Converging from these points on Caporetto, the Germans opened the way down the valleys of the Natisone and Judrio Rivers. This move threatened the rear of the Bainsizza and Carso armies, and compelled them to begin a hasty retreat. The retreat from the plateau through Gorizia across hastily constructed bridges over the Isonzo became a rout. On the 28th, Civadale was taken, which opened up railway communication with Udine, the seat of the Italian Headquarters. This advance also compelled the IV Italian army, which was guarding the frontier in the Carnic Alps, to abandon the passes on the frontier and retreat down the streams flowing into the Tagliamento and Piave Rivers. On October 30, Udine fell, and by November 1, the Austro-German forces had reached the Tagliamento River, which they crossed in scores of places after a slight pause The Italian II army was no longer a fighting unit. The next river flowing into the Gulf of Trieste was the Livenza. This offered very little chance of resistance and was defended merely to give more time to prepare the line of the Piave River, from 10 to 20 miles farther west French and British infantry and heavy artillery, which were sorely needed, were arriving daily in ever-increasing numbers, and being sent to the critical points. The French sent six divisions and the British five. At this stage a change in command was made. General Cadorna was succeeded by General Diaz, who was to be assisted by Generals Badoglio and Giardino. Cadorna was assigned to the Supreme War Council, which was organized largely as a result of the Italian disaster (see above). Reserves were held on the Adige line in case the Italians were unable to hold the Piave. The Adige line was very strong naturally, and was practically incapable of a flanking movement such as had won all the rivers so far gained

The line eventually taken by the Italians ran

along the Piave River from the Adriatic to the foothills of the mountains, thence westward across the Mount Grappa group of mountains to the Brenta River where it connected with the lines of the I Italian army, which prolonged the line across the Asiago plateau and through the mountains to Lake Garda. The IV Italian army held the line between the two rivers, while the III held the line along the Piave. The Austro-German attack had by this time exhausted itself and neither the X or XI Austrian armies in the north nor the German and Austrian Isonzo armies were able to make any impression on the new line. During December, therefore, the German divisions were withdrawn. The Austro-Germans had taken almost 4000 square miles of territory, 300,000 prisoners, and 2700 guns. The winter months, which were very severe, were spent by the Italians, with the aid of the British and French, in strengthening the Piave line, particularly at its weakest point, in the mountains.

1918. The Austrian Failure. The long looked for offensive on the Italian front, which was expected to finish the work of 1917, developed in June, 1918, and extended along the whole front from the Asiago plateau to the sea, nearly 100 miles. The Austrian plan of attack was as follows: Field Marshal von Hoetzendorf was to break through the Allied positions on the Asiago plateau, and at Monte Grappa and Monte Tomba, and then march down the Brenta valley, and debouch on to the plains by way of Bassano. In conjunction with Hoetzendorf, General Borovic was to cross the Piave between Montello and the upper stretches of the Piave delta, and thus outflank Venice and leave it the alternative of surrender or destruction. The capture of Montello would assure the Austrian domination of several important railway centres and possibly cause a huge disaster. The offensive was well planned and everything was done to insure its success. The Austrians were well supplied with gas shells, smoke shells, rafts, pontoons, and every other means of carrying on modern warfare. From the outset, the attempts to reach the manufacturing heart of Italy were doomed to failure. In the mountain region the opening attack took the first line trenches from the British and French defenders. Less than two days later, the Allies, at the point of the bayonet, had recovered all the ground lost and some more besides.

The Austrians were little more successful along the Piave. Their success was largely due to the effective use of "tear" shells and smoke screens. They crossed the Piave at several places and, by the 16th, they reached Fossalta and threatened to cross the canal of the same name, which branches off from the Piave at Fossalta and extends to Porte Grand. Nature now came to the aid of the Italians, in the form of exceedingly heavy rainstorms, which made the Piave a swollen flood. This had two effects: first, by washing away nearly all the bridges, it cut off almost completely the Austrians on the western bank of the river; and second, it enabled Italian naval monitors of light draft to go up the river and heavily bombard the Austro-Hungarian positions. On June 23, the Italians began an offensive all along the western bank against the isolated Austrian positions. By the first week in July, not only had the Allies driven the enemy back to its old positions, but in some cases had captured ground that had been lost in 1917, notably the delta at the mouth of the Piave. The offensive and counter-offensive had now exhausted themselves and General Diaz held the line of the Piave until ordered by Foch to open an offensive.

Complete Collapse of Austria-Hungary. Austria-Hungary was the third member of the Central Alliance to make a separate peace with the Allies (see below). An armistice amounting to unconditional surrender was signed on November 3, after Italy and her Allies had secured one of the most decisive victories of the War in which 63 Austrian divisions were utterly routed by 51 Italian divisions, 3 British, 2 French, and 1 Czecho-Slovak division, and the 332d American infantry regiment. On November 4, the Italian War Office reported "The Austro-Hungarian Army is destroyed. It suffered heavy losses in the fierce resistance of the first days of the struggle, and in pursuit it has lost an immense quantity of material of all kinds, nearly all its stores and depots, and has left in our hands about 300,000 prisoners, with their commands complete, and not less than 500 guns."

The main attack was made on October 24, when the Italians and their allies began a heavy artillery fire in the mountainous regions around the Asiago plateau and Monte Grappa. The first Italian infantry assault forced a passage of the Ornic River and captured Monte Salarole, and parts of Mounts Prossolan and Pertica. By the 28th the allied armies had forced their way across the Piave and were driving the enemy precipitously before them, with cavalry units well in advance of the infantry. The Austro-Hungarians were in a disorderly rout and made absolutely no attempt to carry along or destroy their munitions and supplies. Vittorio was reached on the 30th, and on the next day Italian forces reached Ponte nelle Alpi, which separated the Austrian army in the mountains from that along the Piave. The capture of the Vadal Pass on the same day penned 15 Austrian divisions between the Brenta and Piave Rivers.

By November 1, four armies had reached the Livenza and cavalry outposts had operated almost to the Tagliamento. On the 2d, the Italians had advanced in the Trentino as far as the Sugana valley and by the next day, when the armistice was signed, Roverato and Trent were occupied. Italian and British cavalry also had entered Udine and had overrun the plains surrounding it. On the last day of the fighting, Italian land and sea forces had occupied the great Austrian naval base and seaport at Trieste.

On October 31, Austria-Hungary sued for an armistice. Terms were handed to her on the next day, which were accepted. They went into effect on November 4. The more important clauses provided briefly for the demobilization of the Austro-Hungarian Army on all fronts, the evacuation of all occupied territory, wherever held by Austro-Hungarian troops, repatriation of Allied prisoners of war, and the occupation of any strategical points in Austria-Hungary by the Allies that they desired.

BALKAN FRONT

Serbia, Bulgaria, Saloniki. War was declared by Austria on Serbia June 28, 1914, and at once Austrian forces began to concentrate on the Serbian frontier. Serbia began

her mobilization two days before Austria declared war. The Austrian plan was to invade the northwest corner of Serbia; one corps was to cross the Save River at Shabatz and three were to cross the Drina River from Bosnia. Accordingly, after demonstrations on the Danube, on August 12, she sent her first troops over at Losnitza on the Drina and on the same day she crossed the Save near Shabatz. Other troops crossed the Drina at Zvornik and Linbovia. The direct objective of the Austrians was to reach Valievo, and thence Kraguyvats, the site of the national Serbian arsenal. The commanding generals of the respective sides were Potiorek (Austrian) and Putnik (Serbian).

The line of the Austrian invasion being known, the bulk of the Serbians moved to meet it in the direction of the Jadar valley, while sending troops to the northwest to offset the invasion from Shabatz. In the meantime the Austrians moved up the Jadar, and the Serbians intrenched at Jarebitze, across the valley. The battle opened in earnest August 16, on the Serbian right. The action, lasting all day, resulted in the defeat of the Austrians, and in bringing to naught their plan to join their forces on the Jadar. It also left the Serbians free to operate against Shabatz, which they entered on the 14th While this operation was going on, the Austrians farther south had been retreating to the Drina, and the Austrian invasion had failed, due to overconfidence and exposing their columns to separate attacks by the Serbians who were thoroughly acquainted with the country.

On September 1, the Serbs invaded Syrmia, a province lying between the Save and the Danube. On the whole this step was ill-advised, and in any case of short duration, for now the Austrians were about to launch another invasion, like the first, from the line of the Drina, under the same general.

After six weeks of position fighting the Serbs retreated, abandoning the Matchva and the Tzer. On November 1, the Austrians again invaded Serbia from the same frontier with two armies, composed of four active corps and reserve divisions. Valievo was entered on the 11th. The Serbs now took up a position down the Kolubara River to the Lyg, up which their line turned to the southeast; the heights south of this position were occupied and protected by earthworks. On the 11th, the Austrians attacked towards Lazorevatz, and moved against a detached force 20 miles southwest guarding the valley of the western Morava. On November 20, the first of these attacks proved successful and drove in the Serb centre. By the 24th, the action had extended over the whole front with continued success falling to the Austrians. They had now succeeded in extending their front to Belgrade, which they entered December 1, and thus had cut the region in two, driving back the Serbs in the direction of Kraguyevats, on a line from the Belgrade railway to the western Morava. The situation was now saved to the Serbs by the resumption of the offensive. On December 2 they attacked, and in the next few days drove back the Austrians right and centre to Valievo. The advance was equally successful in the other sectors. Its result was an interposition between the three Austrian corps in the south and the two farther north. The three southerly corps retreated as well as they could on the frontier. The action now turned towards Belgrade, towards which the Austrians were steadily driven back. The evacuation of the capital occurred on December 14 and 15.

It is difficult to understand the object of Austria's operations in Serbia during 1914 when she needed all her troops on the Russian front. It was highly improbable that the Serbians would cross the Danube and an invasion of the mountainous provinces of Bosnia and Herzegovina could have been easily defeated by the local corps stationed there. It was to her interest to remain on the defensive on this front.

1915. Bulgaria. In October, 1915, Serbia was once more called upon to defend her territory, for Bulgaria had finally decided to cast in her lot with the Central Powers (see BULGARIA). Accordingly her armies crossed the Serbian frontier towards Nish, striking in conjunction with the Austro-German forces which had already begun their invasion from the north under the leadership of Von Mackensen. Meanwhile French and British troops, under an arrangement with Venizelos, the prime minister of Greece, debarked at Saloniki, and were hastening up along the Saloniki-Nish railroad. In the first week of October the Austro-German army crossed the Danube near Belgrade and at Semendria, while other armies attacked farther west along the Drina and Save Rivers. Bulgaria's first operations were directed towards Nish; but realizing the danger of the arrival of Allied reinforcements at Saloniki, the Bulgarians then developed their main attacks farther south against the railroad at Vranya and Vilandovo. The advance of the Austro-German columns was at first slow, for by the end of October they had gained, advancing on a 100-mile front, only from 25 to 40 miles south of Belgrade. In the south, however, the Bulgarians having seized the Nish-Saloniki railway at Vranya, promptly confirmed their grip on the enemy's line of supplies by taking the important city of Uskub (October 22), and Veles, 25 miles farther south

The Germans took the Serbian arsenal at Kraguyvats during the second week in November. In the meantime, the other Austro-German columns had reached the east and west line of the Western Morava before the middle of the month. The fall of Nish was not long delayed, upon a heavy bombardment by the Bulgars. A route to Constantinople had already been opened via the Danube, when Germans and Bulgars joined hands near Orsova.

Meanwhile the Anglo-French forces from Saloniki held the railroad from Krivolak south to the frontier, and had gained some successes against the Bulgars around Strumnitza. The French were scarcely able to maintain their position on the Vardar and Cerna Rivers, and the small British force was but little in evidence north of Doiran.

The remaining strokes in Serbia's defeat followed quickly. Sienitza, Novibazar, and Mitrovitza (the last the temporary Serb capital) fell in rapid succession before the Austro-German columns. Teutonic and Bulgarian invading forces joined hands at Prishtina, on the railroad branch south of Mitrovitza. On November 30, the two remaining cities of importance, Prisrend and Monastir, were lost to Serbia. The fugitive Serb army was driven either into Montenegro or Albania. At the beginning of December, the main object of the German-Bulgar campaign in Serbia had been achieved. The

Serbian army had been eliminated as a fighting force and the surviving Serb troops, fewer than 100,000 men, had retreated into Montenegro and Albania en route for the Adriatic shores.

The retreat of the Serbs from Katchanik left the French left flank, on the Cerna River, in a critical position. The retreat of the Allies, however, was skillfully conducted, and they succeeded in escaping to neutral territory, where they fortified themselves at Saloniki, with the intention of holding their position at all costs and using it as a base for future operations.

Year of 1916. Montenegro was conquered by the Austrians in January, 1916. The Austrians then proceeded to take Scutari in Albania (Jan. 26, 1916), and joined hands with the Bulgars, east of Durazzo, February 17. The Italians abandoned the place February 26, and the Austrians now advanced against Avlona. The remnant of the Serbian army was transported by the Allies from the Albanian coast to the island of Corfu to undergo reorganization. After a few months' rest the refitted army was taken to Saloniki to reinforce the French and British.

When Rumania decided to enter the War on the side of the Allies (see below) one of her terms was that the Allies should begin an offensive from Saloniki to prevent Bulgaria from taking part in the operations against her. About the first of August, therefore, General Sarrail was made commander-in-chief of the Allied forces and began operations in the centre against the Bulgarians on his front. The Bulgarians replied by invading Greece and occupying the line of the Struma River and the fortress of Kavala on the coast of Macedonia and the town of Florina west to Lake Ostrovo. Sarrail, not being able to advance in the centre, transferred his offensive to the west and the French and Serbs captured Florina and advanced into Serbia, capturing Monastir about the end of November. This campaign was of little assistance to the Rumanians. The failure of Greece to declare war on Bulgaria after the invasion of the country led to the establishment of the Greek revolutionary government under Venizelos at Saloniki and on some of the Greek islands.

Year of 1917. No events of any importance occurred on this front during this year. General Sarrail began an offensive in the spring but gave it up very shortly, accomplishing nothing. King Constantine was forced to leave the country and one of his sons was placed on the throne by the Allies in the course of the year (see GREECE). Greece declared war on the Central Powers and the Greek army was organized and trained to aid the Allies.

1918. Surrender of Bulgaria. The Bulgarians were very much dissatisfied with the terms of the Treaty of Bucharest and resented the action of the German and Austrian governments, which had dictated the terms. Of the Bulgarian army at this time, Ludendorff says: "The Bulgarian army had time for rest and training. But it could not be denied that since March its spirit had visibly deteriorated, owing to bad food and clothing. The irritation against Germany was cleverly fomented by hostile propaganda and by Bulgarians who favored the Entente. The peace of Bucharest and the withdrawal of a few German units to the west added fresh fuel to it."

Bulgaria was the first of the Central Powers to surrender to Allied arms. This act marked the beginning of the end of the great War. Bulgaria's surrender was the direct result of a brilliant offensive carried out by the Allies under the supreme leadership of Gen. Franchet d'Esperey, who assumed command of the Saloniki front in June, 1918. The artillery preparations began on Sept. 14, 1918, and on the 17th and 18th the Allied right started to advance, as well as the centre. British and Greek troops struck around Lake Doiran, on the right of the Macedonian front; French and Serbian troops struck in the centre, and Italians struck on the left rear and in Albania. By September 22, the Serbians had succeeded in cutting the communications of the I Bulgarian army, operating along the Vardar, and those of the II army and the Germans north of Monastir. This day saw a general pursuit of the armies of the Central Powers on a 90-mile front. On the 23d, the Serbians and French crossed the Vardar. On the 24th French cavalry entered Prilep. The British entered Strumnitza on the 26th, and the Serbians reached Kochana and Veles. The road to Sofia was opened to the victorious Allies. Consequently the Bulgarians sued for a separate armistice. One containing terms of unconditional surrender was granted on the 30th, when active fighting ceased. The last act of the fighting was the occupation of Uskub by the French on the 30th.

A brief summary of the armistice terms, which were purely military, are as follows: Bulgaria was to evacuate all Allied territory, demobilize her army as rapidly as possible, and turn over to the Allies all means of transport. The Allies were to be allowed to pass through Bulgaria if necessary to future military operations; control of the Danube and Bulgarian merchant marine on that river was to be given up; all important strategic points to be occupied by the Allies if they wished; the armistice was to remain in force until a general peace was concluded.

Interest in the Balkans after the signing of the armistice centred in the driving out of Austrian troops from Albania, Serbia, and Montenegro. On October 1, the Bulgarians began to evacuate Serbian territory, and two days later the Austrians began the evacuation of Albania. By the end of the month they were well out of Montenegro also. On November 3, Belgrade was reoccupied and the II Serbian army crossed the Danube and Save Rivers, and on the 10th entered Sarajevo, the Bosnian capital and scene of the assassination of the Archduke Francis Ferdinand and his wife on June 28, 1914.

RUMANIAN FRONT

As has been stated above, the question of Rumania's entrance into the War was settled on Aug. 27, 1916. Her period of neutrality was greatly affected by events on the Russian and Dardanelles' fronts. The failure of the Gallipoli campaign, the Russian retreat, and the invasion of Serbia kept her out of the War in 1915. After Brusiloff's successful advance in June, 1916, Rumania determined to enter the War on the side of the Allies. She frankly admitted that her action was influenced to a great extent by the thought that the time was ripe to put into effect her nationalist policies. She made the following demands upon the Allies before she took the decisive step: Brusiloff was to keep up his offensive, the Saloniki army was to

attack, certain concessions of territory were to be made to her, and she was to be supplied with ammunition, etc. These demands being promised, Rumania declared war. Her reliance on the Allies was too great, however. Her chief weakness was lack of ammunition. As this could be supplied only through Russia, it was inevitable that Rumania should go short, because Russia had scarcely enough for herself, in the first place, and in the second, the Russian Revolution soon put Russia out of the War. This new force added about 500,000 trained men to the Allied cause. Including the reserves, 900,000 men could be put into the field.

The territory of Rumania forms a great letter Y. The base is formed of the province of Dobrudja, which is bounded on the south by Bulgaria, on the east by the Black Sea and on the north and west by the Danube. The two arms are formed by the province of Moldavia, which extends northward between the Pruth River and the Carpathian range of mountains; and the province of Wallachia, which extends westward between the Danube and the Transylvanian Alps. The two mountain chains form a great barrier 350 miles long, separating Rumania from Hungary.

The Rumanian plan of operations contemplated an invasion of Hungary by three armies deployed over this immense front, which were to advance in a number of small columns through the passes and eventually unite on the Maros River near Karlsburg for the final advance to the range of mountains separating Transylvania and Hungary proper. The Rumanians proposed to hold and annex Transylvania, which was largely inhabited by Rumanians. Assuming that even if Bulgaria declared war, her forces would be held by the Allied advance from Saloniki, the Rumanians left a single army to guard the line of the Danube and the Bulgarian frontier.

The plan of the Central Powers was to form a group of three armies for operations in Transylvania and one in Bulgaria. One of the former armies was composed of the scattered troops on the frontier at the beginning of hostilities and the other two were to be new armies organized from reserves and troops on other fronts; i.e. the I Austrian and the IX German. The German army was to be commanded by von Falkenhayn, late chief-of-staff. These new armies would not be concentrated before the middle of September. In Bulgaria, a group under von Mackensen was to be formed of the III Bulgarian army and a number of German and Turkish divisions.

In the campaign which began on August 28, we note the following phases:

Aug. 28 to Sept 20.	Advance of Rumanian armies into Transylvania and the advance of Mackensen's group into Dobrudja.
Sept 20 to Oct. 20	Retreat of Rumanians from Transylvania. Mackensen held in check in Dobrudja.
Oct 20 to Nov. 10	Austro-Germans held on the frontier in the north Mackensen advances in Dobrudja across the Bucharest Constanza railway.
Nov. 10 to Nov. 25.	Austro-Germans penetrate Vulcan Pass and reach the plains of Wallachia. Mackensen held in check in Dobrudja.
Nov. 25 to Jan. 10.	Mackensen crosses the Danube at Sistova with his German and Turkish forces and with the Austro-German forces from the north drives the Russian and Rumanian forces out of Wallachia and across the Sereth River. The Bulgarians left in the Dobrudja hold the Russo-Rumanian forces in check until the latter retire from the Dobrudja, when the Bulgarians cross the Danube and rejoin Mackensen.

On August 28, the I, II, and IV Rumanian armies crossed the mountains; the I army in the west from the Danube to the Red Tower Pass; the II army in the centre between the Gyimes and Tarsburg Passes, and the IV army north of the Gyimes Pass. The II and IV armies met with little opposition and by September 20 were on the meridian of Fogaras between the Maros River and the Carpathians. The various columns of the I army met with greater opposition, and had barely reached the base of the mountains. At the Red Tower Pass the column had taken Hermanstadt and at the Vulcan Pass the town of Petrosiny. The division on the Danube had taken Orsova at the Iron Gates. While the Rumanian armies were advancing triumphantly in Transylvania, Bulgaria declared war on September 1 and immediately von Mackensen crossed the frontier into Dobrudja, and on September 6 captured the larger part of two divisions left by the Rumanians on the south bank of the Danube at Tutrakan. This unexpected blow caused the Rumanians to divert the commander of the II Rumanian army —Averescue—with some of his divisions from Transylvania to the Dobrudja to check the advance of Mackensen. This he was able to do before Mackensen reached the Bucharest-Constanza railway.

Such was the situation about September 20 when the I Austrian and IX German armies had completed their organization and were ready to move. Their plan was first to secure the Vulcan Pass and then penetrate the gap between the II Rumanian army at Fogaras and the I army at the Red Tower Pass and attempt the capture of the Rumanians in the vicinity of Hermanstadt by seizing the pass in their rear. The operations were successfully executed; both passes were captured, with a large number of Rumanian troops. Leaving guards in the passes, the main body of the two armies moved eastward against the II Rumanian army, which was obliged to seek safety by falling back to the mountain passes. The IV Rumanian army was compelled to conform to this movement and by October 20 both armies were back in the mountain passes. The Russians now relieved the IV Rumanian army so it could be used farther south. During this period Mackensen was unable to advance and called for reinforcements.

As a result of the retreat of the Rumanian armies in the north, Averescue was sent to his old command, the II army, and strenuous efforts were made to hold the I Austrian and IX German armies at the mountain passes. In this the Rumanians were successful during the latter part of October and the early part of November. During this period, however, Mackensen, having received reinforcements, broke through the Rumanian defense in Dobrudja and succeeded in advancing across the Bucharest-Constanza railway and capturing the seaport of Constanza. A short distance east of the railway he was obliged to again intrench, as the Rumanians had been strongly reinforced by Russians and he met with temporary defeat.

Early in November the Austro-Germans north

of the mountains received further reinforcements and made a determined effort to reach the Wallachian plains by the Vulcan Pass, where the Rumanians were weakest. After 10 days' hard fighting they succeeded in reaching Craiova and about November 25 were on the Aluta River facing east. As soon as he was assured that the northern armies would reach the Wallachian plains, Mackensen decided to leave the Bulgarians to hold his trench line in Dobrudja and transfer his German and Turkish troops to the north bank of the Danube. These troops were ferried across the Danube November 23–25 at Sistora and Mackensen assumed command in Wallachia. The Rumanian division that had taken Orsova was now wholly cut off and was later compelled to surrender.

From November 25 to January 10, the Russo-Rumanian armies were driven steadily eastward and the passes in the north were evacuated in succession. At the close of the operations the opposing armies were facing each other along the Sereth River. The Dobrudja was evacuated by the Russo-Rumanians and most of the Bulgarians joined von Mackensen on the north bank of the Danube. Moldavia still remained in the possession of the Rumanians, who moved their capital to Jassy, as the Russians still held the passes of the Carpathians.

In October, a French Military Mission reached Bulgaria, and after the close of hostilities, the Russians took over the front and the Rumanian army was reorganized and trained by French officers.

1917. In July, 1917, the Rumanians were again to assume the offensive in cooperation with Brusiloff's offensive under the Kerensky government. The Russian advance, however, soon terminated in a rout and operations ceased. In December, the Bolshevik government entered into an armistice with the Central Powers and Rumania was compelled to follow suit.

1918. After the surrender of Bulgaria, September 30, Rumania again took up arms but the surrender of Austria followed so quickly that the Rumanian forces were not engaged.

TURKISH FRONT

The strategic importance of Turkey from the Germanic point of view lay in keeping supplies from Russia through control of the Dardanelles. Activities on the Turkish front manifested themselves in five distinct phases: (1) Armenian front (a) Turkish thrust against Russia (1914–15), (b) Russian campaign (1916) forcing the Turkish armies behind Trebizond, Erzerum, and Bitlis line to the west and threatening Bagdad on the south; (2) British advance in Mesopotamia; (3) Turkish attack on the Suez Canal; (4) Gallipoli campaign by Franco-British forces; (5) conquest of Mesopotamia and Palestine with resultant collapse of Turkey.

War was begun by Turkey and Russia on Oct. 31, 1914, through the activities of the Turkish fleet, but formal declaration was withheld by the Allies until the first week in November. As a matter of fact Turkey began to mobilize at the end of July, 1914, and by the end of October it was estimated that she had 500,000 men in her army with 250,000 more at the depots. The strength of her army on a peace basis was estimated at 250,000. Attempts had been made by German officers to reorganize and train the Turkish army just previous to the Balkan wars, but without much success. The staff and supply services were woefully weak, and the great quantities of artillery lost in those wars were scarcely replaced. The country was divided into four military districts with headquarters at Constantinople, Erzingan in Armenia, Damascus in Syria, and Bagdad in Mesopotamia. At the beginning of the War, Allied troops appeared in the Caucasus district of Russia on the Armenian border and in Mesopotamia a British force landed at Fao at the mouth of the Shatt-el-Arab River and secured a base for operations in Mesopotamia.

1915. Armenian Front. On the Armenian front the Russian base for operations was Kars and the Turkish base Erzerum, opposite Kars. Each city was about 50 miles from the frontier and about midway between the Black Sea and Mount Ararat. About the middle of November, 1914, a Russian column crossed the Turkish frontier and advanced about half the distance to Erzerum along the roads leading to that base. In the meantime a Turkish force advanced against the Russian column, while a corps at Trebizond attempted to reach the flank and rear by way of Kardahan. The Turks crossed the frontier but were defeated and the Trebizond unit got no farther than Kardahan. The Turks recrossed the frontier and operations ceased for the remainder of 1915 because both the Russian and Turkish troops were needed elsewhere. Persian territory was invaded and some operations of minor importance carried out near Tabriz.

Mesopotamia. The Turks had two corps in the Tigris valley, one at Mosul and the other at Bagdad, 200 miles farther south. The British occupied Basra early in November, 1914, to gain a base for operations in Mesopotamia and to protect the British oil fields in southern Persia. The operations of this force were conducted by the Indian government. The force was gradually increased to an army corps and in April, 1915, General Nixon was sent to command it. About the end of May, General Townshend started north up the Tigris with the 6th Indian division, accompanied by naval vessels of light draft. In a month, it reached Amara about 100 miles up the river with only slight opposition. During July the 12th Indian division advanced about 100 miles up the Euphrates.

The advance had been accomplished so easily that the British commanders determined to combine the two forces and advance up the Tigris to Kut el Amara, which is about 100 miles south of Bagdad. The expedition started on August 1, and Kut was reached about the last of September, with only one engagement of any size. The British were successful in this. The pursuit was kept up until the British-Indian army reached Azizieh about halfway between Kut and Bagdad. The problem before the British was now whether to continue on to Bagdad or wait at Kut for reinforcements. Townshend favored the latter course but for political reasons General Nixon overruled him and ordered the advance on Bagdad. Consequently an advance was begun from Azizieh in the middle of November and by the 21st Townshend reached Ctesiphon, about halfway between Azizieh and Bagdad. Here the Turks were strongly intrenched. Townshend unsuccessfully attacked on the 22d. He remained in front of the Turkish positions until the night of the 25th, when,

upon learning that the Turks were about to be reinforced, he began a retreat on Kut. He reached this place December 2, closely pursued and harassed by the Turks. He determined to hold it until relief arrived and as the year closed he was invested by the Turks and his position was very precarious.

Egypt. As early as 1914, the Turks planned a campaign against Egypt, in the hope probably of raising an insurrection in that country. The plan of operations called for the crossing of the Sinai Peninsula through a desert 150 miles wide, as well as the Suez Canal. The main column, consisting of three divisions, was to start from Beersheba in southern Palestine. A smaller column was to follow the coast road from Gaza to El Kantara on the canal, and a third column was to follow a caravan route still farther south and reach the town of Suez. The three columns reached the canal about the first week in February. A miscellaneous force defended the canal, Australians, New Zealanders, Indians, English, and Egyptians. All attacks on the canal were easily repulsed and the Turks retreated unpursued by the Allies. No damage was done to the canal and the front remained stabilized for the remainder of the year.

Gallipoli Campaign. The temptation to strike a blow at the vitals of Turkey by taking possession of the Dardanelles, and hence of Constantinople, was irresistible (for a description of the straits, see VOL. VI). Success here would have met with a rich reward. A way would have been opened to supply Russia with the war munitions she so sorely needed; the Balkan question would have been settled out of hand, and in a manner favorable to the Allies. But the entire campaign was mismanaged from the outset; the nature of the effort to be made was certainly not correctly estimated; efforts were scattered; time was lost.

For the naval campaign, reference should be made to the naval sub-division of this article. It opened Nov. 3, 1914, and it was not until the following March that joint land and naval operations were decided upon after a great deal of bickering and hesitation. By that time the Turks had received ample warning, and here, as elsewhere, under German leadership, had made what turned out to be more than ample preparation.

In the Gallipoli Peninsula, nature was on the side of the defense. Furthermore, the Turks enjoyed an advantage in their supply of men, for the bulk of their forces was in the neighborhood of Constantinople and could therefore be drawn upon as needed. Gen. Sir Ian Hamilton was selected to direct the land operations of the Allies. These were to be carried on by a French force under General d'Amade, drawn from north Africa, and by Colonials, Territorials, and some Indians from Egypt and Imperial troops.

On arriving at Tenedos (March 17), selected as his headquarters, Sir Ian made up his mind that the transports had been so badly loaded that he would not undertake any operations until the loading had been corrected. The transports were accordingly sent back to Egypt to be reloaded. Upon their return five weeks had been lost to the Allies and gained to the Turks. The British began their landings on April 25, under exceedingly great difficulties. The Turkish force on the peninsula was in the neighborhood of 100,000 men, commanded by the German general, Liman von Sanders. The chief landings were made at the tip of the peninsula. Once ashore, the advance was to be made against the village of Krithia, and the height of Achi Baba was then to be carried. At each of the beaches selected the Turks were ready and received the landing party with tremendous fire. Obstacles of all sorts under the water and on the beaches and cliffs were skillfully placed in way of the invaders. The Australian and New Zealand corps (Anzacs) near Gaba Tepe especially distinguished themselves by rushing the Turks with the bayonet, clearing the slopes and securing a foothold on the top. The French landed a regiment on the Asiatic side, near Kum Kale, for the purpose of preventing an attack by gun fire against the transports at the nose of the peninsula. In this they were more or less successful, but at considerable loss to themselves. The result of the work of the 24 hours was that the Anzacs, isolated, were holding a semicircular line against an enemy ever increasing in numbers; at the tip of the peninsula one landing was abandoned, some forces were holding their own but isolated, while other landing parties had managed to join hands. The next three or four days were marked by severe fighting and an advance of the British from the tip of the peninsula. By the afternoon of April 28 some of the troops had pushed up to within 1300 yards of Krithia but could get no farther. The lines then dug in. On May 1, the Turks attacked at night, and there was a counterattack the next day. This is the first so-called battle of Krithia. The second occurred on May 6, and was an attempt to win the Krithia Ridge; this attempt failed but the British advanced their line 500 yards. The third came off on June 4, with the same objective and the same result. The fourth was fought on July 12, and resulted in an advance of 300 yards more or less. Achi Baba still remained in Turkish hands. Meanwhile the Turks were attacking the Anzacs (May 5–10) and were repulsed. They renewed their efforts in great force on May 18, and were again beaten off with great loss. There were other engagements, as that of the French (June 21) who captured a work known as the Haricot Redoubt, and the English action of June 28, known as the battle of the Gully Ravine. And so it went until fresh British forces were landed at Suvla Bay on August 7, and the Anzacs advanced upon the ridges of Sari Bair.

The Suvla Bay landing and simultaneous operations at the tip of the peninsula and by the Anzacs constitute the last great attempt to drive the Turks off the peninsula. In May, Sir Ian Hamilton asked for two additional corps; by the end of July he got them. His plan was now to reinforce the Anzacs and direct them to make a drive and capture Sari Bair. A landing at Suvla Bay would surprise the Turks and might enable the Anzacs after taking Sari Bair to push on to Maidos. The Turks at Krithia and on Achi Baba would thus be cut off. A containing attack was to be made at the tip of the peninsula. This attack was delivered on August 5 and failed. It was renewed on the 7th and resulted in minor local successes; its main purpose of keeping the Turks busy on the spot, and preventing them from lending a hand elsewhere, may be said to

have been realized. The Anzacs, reinforced, attacked on the 6th, and very nearly succeeded in their purpose; but on the 9th an assaulting column lost its way, and arrived too late to clinch the positive gains made on the spur to the southwest of the main elevation (Hill 305) of the Turkish position. During the attack on Sari Bair the landing at Suvla Bay was begun August 6 by night under the direction of Lieut.-Gen. Sir F. Stopford. It resulted in failure, for although the troops got ashore, once there they accomplished nothing. Apparently there was no well thought out plan of operations, or, if there was, it was not carried out. Some of the troop units were landed in places other than those designated, others were late in moving out. Some local successes were obtained, however, and on the evening of August 7, the British extended in a semicircle around the bay. On the 8th, the British stood fast and made no attempt to advance, and so lost their opportunity not merely to accomplish something on their own account, but to help their comrades farther south engaged in the desperate struggle for Sari Bair. There was more or less fighting during the next week. Open fighting gave way to trench warfare. There was one more battle on August 21, when an unsuccessful attack was made to take Hill 100, about 2 miles east of Suvla Bay.

The struggle for the Dardanelles was now virtually over and it ended in a ghastly failure for the Allies. Sir Ian Hamilton was recalled in October, and the whole peninsula evacuated in December and January, some of the troops going to Saloniki, but most of them going to Egypt to be apportioned among the other fronts. General Hamilton in his *Gallipoli Diary* places the blame almost entirely upon the insufficiency of artillery and inefficiency of the Home authorities in supplying guns, ammunition, spare parts, workshops, etc. The British casualties were 100,000 with about an equal number evacuated because of sickness. The Turkish losses were placed at about the same amount.

1916. Armenian Front. As soon as operations were possible in 1916, the Russians, under General Yudenitch, advanced across the frontier from the Black Sea to Lake Van. Another unit under General Baratoff entered Persia to drive the Turks out of northern Persia. In the middle of February, Erzerum was captured. This was followed by the capture of Bitlis and Mush near Lake Van, and Trebizond on the Black Sea in April. In July, Erzingan, the headquarters for Turkish troops in Armenia, was captured. In the meantime the Russian forces in Persia advanced south as far as Kermanshah, then turned toward the frontier which they reached in May; the objective was Bagdad. The surrender of the British forces at Kut, however, prevented this column from advancing past the frontier. In August the Turks began a counteroffensive which resulted in the recapture of Van and Mush. An advance in Persia forced the Russians back almost to their own frontier. The second half of the year saw little fighting on this front but the Russian forces compelled the retention of a large Turkish force also.

Mesopotamia. As stated above, General Townshend was invested in Kut-el-Amara at the close of 1915. His position was a strong one and the Turks made several futile efforts to take it by assault and bombardment. Then they determined to starve the British out. In order to accomplish this they constructed defenses on both sides of the Tigris below Kut to prevent a relief expedition from advancing up the river. About the middle of December, General Lake, who relieved General Nixon, began to organize a relief expedition 50 miles south of Kut. This force was organized around the 12th and 7th Indian divisions. This unit was weak numerically and did not have the proper artillery, transportation, or medical supplies.

The relief force, commanded by General Aylmer, set out on January 4, but received a check at Sheik Saad, 25 miles from Kut. Although the attempt to take the positions by force failed, the Turks abandoned the works by January 9 By the 21st, the British had advanced 6 miles further but were compelled to halt before Umm-el-Heuna, which also successfully resisted an attack in force. They held on here until early March, when they were reinforced. An unsuccessful attack was made on the night of March 8–9. On April 5, with the aid of the 13th division which had arrived from Gallipoli, the British captured Umm-el-Heuna. The Turks, however, merely retired to a stronger position at Sannaiyat a mile in the rear. Attempts to take these works between the 8th and 18th failed, and on April 29, General Townshend and his force of 10,000 men, after 143 days of siege, were compelled to surrender because of starvation. After the fall of Kut operations in Mesopotamia came to a standstill. The British made preparations on a larger and much more efficient scale for an advance on Bagdad in 1917. General Lake was relieved of the command in Mesopotamia by General Maude. The failure in Mesopotamia has generally been ascribed to overconfidence, weather (heat and floods), and inadequate transportation and equipment for trench warfare.

Egyptian Front. After the unsuccessful attack on the Suez Canal in 1915, the British, early in 1916, destroyed all the water holes within 30 miles of the canal to prevent further operations against it. They also determined to construct a railroad north to the Katica oasis and to put a pipe line alongside it. In April and August the Turks made efforts to interfere with this construction work but were repulsed. By the end of the year the British had pushed the railway and a complete and modern water-supply system to within 15 miles of El Arish, the most advanced of the Turkish strongly held positions. This activity presaged an attack in Palestine in the near future. During the year the revolt of the Arabs in Hedjaz occurred (see HEDJAZ).

1917. Palestine. The British began an advance on Rafa on the Sinai Peninsula, based on the railway which had been constructed there. This town fell early in February and the British advanced northward toward Gaza and eastward toward Beersheba. They were compelled to spend the summer on the Gaza River after failing to take these places in two attacks. In October they advanced again and by January, 1918, had won a series of brilliant successes. On October 31, Beersheba was taken and on November 6, Gaza fell. By November 15, General Allenby had cut the Jaffa-Jerusalem railway at Ludd and Er Ramle. Two days later Jaffa, the port of Jerusalem, was occupied. The British advanced down the Surar River val-

ley toward the Holy City and up the Damascus-Beersheba railway in order to encircle the city and cut off its supplies, so that it would not come under the bombardment of the artillery. All the towns surrounding the city were gradually taken by storm and as the British closed in it became apparent that the Turks would not risk a siege. The city fell on December 10 There was general rejoicing throughout the world over the return of the city to Christian hands after having been in Turkish hands for almost seven centuries. The Turks west and northwest of the city broke up into small bands and carried on guerilla warfare until the British finally got control of all the high land. General Allenby then pushed across a small stream 4 miles north of Jaffa and captured several small towns which gave him all the high land in the neighborhood, and assured a good defense of the Jaffa-Jerusalem railroad.

The success of the British arms in Palestine effectively put an end to Turkish threats on the Suez Canal and Egypt which had been going on for three years. It also revived the hopes of the Zionists, who dreamed of reëstablishment of the Jewish nation in Palestine The British government announced on several occasions that it looked with favor on the Zionist movement.

Mesopotamia. General Maude, who took command of the Mesopotamian forces in August, 1916, spent the remainder of the year in reorganizing his command and lines of supply. During the same time the Turks had reduced their force at Kut, although they considerably strengthened their positions When General Maude was ready he began an attack on the Turkish lines east of Kut between the Tigris and the Hai (Dec. 20, 1916). By the middle of January, 1917, the British reached the Tigris up as far as Kut. A month later the Turks evacuated their works on the south bank and were all on the north bank of the Tigris, which owing to floods was 350 yards wide at this point. Under great difficulties the British crossed the river on February 23. The Turks were now in full retreat. On March 11, the British entered Bagdad. This campaign did much to restore the prestige of the British in Mesopotamia and throughout the entire Moslem world. It also compelled the Turkish forces in Persia to retreat. The remainder of the year was spent by the British in making their position secure within a radius of 100 miles of Bagdad.

1918. Collapse of Turkey. Turkey was the second member of the Central Powers alliance to surrender to Allied arms. This was a direct result of a crushing defeat administered by General Allenby. As was narrated above, Jerusalem was captured by General Allenby in December, 1917. Between that time and September, 1918, the British commander was making preparations for his attack on a grand scale. His first object was to secure his right flank by the capture of Jericho and the line of the Jordan. This operation was carried out in February, and was highly successful, the two objectives having been taken shortly after the middle of the month. During March General Allenby was engaged in gaining a line which would enable him to carry out operations east of the Jordan and against the Hedjaz railway, in cooperation with the Arab forces under the Emir Faisal. These were southeast of the Dead Sea and were under the command of Allenby. Rainy weather and the raising of the level of the Jordan River prevented General Allenby from making any advance across that river. He made several raids which materially hindered the Turkish forces. His further progress was also held up by the difficulties of the Allies in France. He reported that in April the 52d and 74th divisions, 9 yeomanry regiments, 5½ siege batteries, 10 British battalions, and 5 machine gun companies were withdrawn preparatory to embarking for France. In May, 14 more battalions were sent to Europe. During July and August, 10 more British battalions were withdrawn from the fighting in the eastern area While it is true that most of these units were replaced by Indian forces, nevertheless his actual fighting force was so reduced that he was unable to continue the advance against the Turkish troops until the following September. During the hot summer months the only fighting of any note was an attack delivered by Turkish-German forces on July 14 It gained initial successes by taking Abu Tellul, an important height, and surrounded several other advanced positions. These gains were almost immediately lost again as a result of a brilliant counterattack by Australian forces.

On September 18, the British and the Arabs began an advance in Mesopotamia and Palestine which was ultimately to result in the surrender of Turkey and settle once and for all the Berlin to Bagdad route which had already been broken by the collapse of Bulgaria. Allenby made minute preparations for his blow and completely fooled the Turks as to his intentions. The British, with some French forces in support, struck on a 16-mile front and broke through the Turkish lines between Fafat and the sea and advanced 13 miles. By the 22d, enemy resistance between the Mediterranean and the Jordan River had practically broken down completely and the Allies were forging ahead rapidly. In four days they had advanced approximately 60 miles and had occupied Beisan, Nazareth, and El Afule. Arab forces east of the Jordan destroyed railroads and bridges crossing the stream and thus forced the Turks to retreat in a northerly direction only. Haifa and Acre were seized on the 23d and the Turks east of the Jordan were forced to retreat southerly in the direction of Amman. Three days later saw the British at the Sea of Galilee and the occupation of Tiberias, Semakh, Es-Samra, and Amman. On the 27th the British forces joined with the Arabs east of the Jordan at Mezeris The advance was now a steady pursuit, without any frontal fighting on the part of the Turks. Damascus fell on the 1st of October, Zahich and Rayak on the 6th, and Tripoli and Homs on the 16th. In the first three weeks of the campaign more than 80,000 prisoners and 350 guns fell into the hands of the British and Arabs.

The last half of October saw the capture of Aleppo and the complete defeat of the Turkish troops along the Tigris by British forces under General Marshall. This last event was accomplished by the capture of Kaleh Sherghat, which completely cut off communication with Mosul, which, with Aleppo, was the main base of supplies of the Turkish-German forces in Asia Minor.

Facing a supreme disaster, the Turks sued for an armistice. They sent the British gener-

al, Townshend, who had been captured at Kut-el-Amara, to the Allied commander of the Ægean fleet, Vice Admiral Calthorp, to ask for terms. He asked for regularly accredited agents to carry on the negotiations. These were sent to the island of Lemnos, and after a three-day session, terms were handed to the Turks which they accepted on October 30, and which went into effect the next day. A summary of these terms, which practically amounted to unconditional surrender, follows:

The Dardanelles, Bosporus, and Black Sea were to be opened to the Allies; there was to be immediate demobilization of the Turkish army; surrender of all Turkish warships, and use of mercantile vessels; Allied occupation of any strategical points in Turkey desired by them; immediate withdrawal of Turkish forces from Persia; all Germans and Austrians to get out of Turkey within a month and Turkey to break off all relations with their countries.

COLONIES

Africa. As early as Aug. 7, 1914, the British government telegraphed the South African government to suggest the desirability of seizing such parts of German Southwest Africa "as would give them command of Swakopmund, Luderitzbucht, and the wireless stations there or in the interior," but before operations could be carried on against German territory the local government found itself face to face with a rebellion. See SOUTH AFRICA, UNION OF.

Togoland was taken in a campaign that lasted just three weeks, Aug. 7–28, 1914. Surrounded on three sides by hostile territory, with the sea under British control, it could not hope to offer any resistance.

Kamerun called for a more serious effort on the part of the Allies Like Togoland, it was surrounded on three sides by hostile territory, with the sea under Allied control, but its vastly greater area made operations more difficult and it was more strongly defended. Three expeditions from the northwest were defeated by the Germans in August and September, 1915. Attacking from the sea, however, the Allies took Duala (September 27) and from this point widened their holdings. Two columns pushed their way into the interior along the railways; one of them on October 26 took Edea, repelling six weeks later a counterattack for its recovery. The other column north of Duala captured the entire railway and advanced beyond its head. The French sent down troops from the Tchad, and others, reinforced by Belgians from Equatoria. The result of all these efforts was that German resistance was well worn down, and came to an end with the surrender of Mora Hill early in 1916.

In *German Southwest Africa* the situation was complicated by the South African Rebellion. This rebellion crushed, real operations began in January, 1915, Luderitz Bay having been occupied as early as Sept. 18, 1914. Swakopmund was occupied January 14. The campaign was directed against Windhoek and carried on by two armies; the northern under Botha was to move from Swakopmund, while the southern under Smuts, divided into three columns, was to move east from Luderitz Bay, north from Warmbad, and west from Bechuanaland. By May 1, the end was near. On the 12th, Botha entered Windhoek and the struggle was practically over; for, pushing on to Grootfontein, now the German capital, he received there the surrender of the enemy forces, on July 9.

German East Africa, the most important colony in Africa, gave the British far more trouble than any of the others. During August, 1914, some successes fell to the British—for example, they demolished, August 13, the port of Dar-es-Salaam—but they decided to remain on the defensive, waiting for troops from India These arrived November 1, and lay off the German port of Tanga. An attack made on the 4th resulted in a decided reverse for the British, who were compelled to reëmbark. The Germans now invaded British East Africa, but were pushed back to Jassin in German territory, where on January 18 they defeated the British, and forced a withdrawal of all outlying posts in that region. They had, as early as September, 1914, invaded northeast Rhodesia, where they came into contact with Belgian troops. General Smith-Dorrien, later relieved by General Smuts, was sent out to take command of the troops in British East Africa and the invasion proceeded from that region, as well as from Nyasa on the south.

The British expedition, commanded by General Jan Smuts, won an important victory at the Kitovo Hills, near the northern boundary of German East Africa. After five days of fighting (Mar. 7–12, 1916) the Germans fell back to a position in the forest along the Rufu River. As a result of the operations that followed, the Germans, although reinforced, were compelled to abandon their positions and retire southward along the Tanga railway.

In September, 1917, the Allies began to tighten the ring around the colony. The Belgians, French, British, and Portuguese were invading it from all sides. All of the seaports were in their hands and Tabora, a strong fortress in the north, was captured (September 1–11), by the Belgians. General von Lettow-Vorbeck, the German commander who held out for such a long time against the Allies, finally surrendered on Nov. 14, 1918, three days after the Armistice was signed.

The Pacific. Japan, as Great Britain's ally, declared war on Germany Aug. 23, 1914, but confined her offensive to Germany's possessions in the Pacific. On August 27, she began the blockade of Tsingtao, and by the end of September, two Japanese armies and a few English troops had completed landing, one on the north and the other with the English at Rozan Bay The German defenses consisted of three lines, the first of fortified hills, the second of 10 forts, and the third of five. By September 28, the first two lines had been carried, and the siege was begun. On October 31 a general attack was opened on the third line which was occupied November 6. The next day the place was surrendered.

For the capture of the other German islands in the Pacific see the section on *Naval Operations*, below.

NAVAL OPERATIONS

Operations in North Sea and Waters About Great Britain. At the end of July, 1914, the German High Seas Fleet was off the coast of Norway and nearly the whole of the British Grand Fleet lay at Spithead off the Isle

of Wight. As the probability of war increased, more and more definite steps were taken to prepare for mobilizing the entire British naval force and putting into commission all ships in reserve and laid up. On August 2, German troops invaded Belgium; on July 29, the British Grand Fleet got under way to proceed to its war base at Scapa Flow. On August 4, Great Britain and France declared war and mobilization of both fleets was directed. Within four hours of the declaration of war, British scouting squadrons were sent towards the German coast, and one submarine flotilla explored the Helgoland Bight.

The German High Seas Fleet, being vastly inferior to the British forces facing it, was hastily withdrawn behind the defenses of the German coast at Kiel and in the Kaiser Wilhelm Canal.

The laying of mines now proceeded with great rapidity. Not only were the German harbors and the vicinity of Helgoland protected but the North Sea was planted with mines where they were most likely to be useful and the passages leading to the Baltic were closed excepting a narrow strip along the coast in Swedish territorial waters, the channels in the mined areas being known only to German and Danish pilots. The separate mine areas were small or narrow but were so numerous as to make navigation dangerous. The British thereupon closed the Strait of Dover by a mined area. They then began a systematic search for German mines, mine layers, and protecting forces, and also despatched their mine-sweeping groups of trawlers as fast as work was found for them. It was in connection with mine planting that the first naval action of the War was brought about. On August 5, H. M. S. *Amphion*, with the third destroyer flotilla, was carrying out a prearranged plan of search when a suspicious ship was reported by a trawler. This was the German mine-layer *Konigin Louise*, and she was chased and sunk; but early the next morning the *Amphion* struck a mine and was herself destroyed

On August 9, protected by the Channel squadron and a special detail of cruisers and destroyers, the first expeditionary force of the British army crossed to France; and thenceforward there was a similarly protected steady stream of transports carrying men, munitions, and supplies.

On August 26, the Eighth Submarine Flotilla, two destroyer flotillas, and their flag cruisers and tenders were ordered to proceed and reconnoitre Helgoland and the waters to the southward. They were followed by the battle cruiser and first light cruiser squadrons. On August 28, the destroyer flotillas, when about 25 miles from Helgoland, and not much farther from Wilhelmshaven, found the enemy in superior force and were compelled to fall back. Admiral Beatty promptly sent the First Light Cruiser Squadron to their assistance, but, as the enemy's force seemed strong, he soon decided to follow with his heavy vessels. The advent of the battle cruisers quickly decided matters. In a short time the German vessels were retiring along the whole front. The light cruisers, *Mainz*, *Köln*, and *Ariadne*, and the destroyer *V-187* were sunk. No British vessels were lost, but the *Arethusa*, flagship of the destroyer fleet, was severely injured and had to be towed to England. The *Queen Mary* was twice attacked and the *Lowestoft* once, by submarines, but the high speed in each case made the attempt abortive. The short range of the torpedoes used in the German submarines was first noticed in these attacks. This action caused the Germans to adopt a purely defensive position.

The month of September was a particularly eventful one. On September 3, the British gunboat *Speedy* was destroyed by a mine and, on September 5, the light cruiser *Pathfinder* was sunk by the German *U-21*, the first surface craft to fall a victim to the dreaded submarine. On September 28, there came an event which startled the world and greatly added to the prestige of the submarine. About daylight that morning, the British armored cruisers *Aboukir*, *Hogue*, and *Cressy* were on patrol duty in the North Sea and steaming at moderate speed in column. At 6.25 A.M., the *Aboukir*, which was leading, was struck by a torpedo from a submarine and began to sink slowly. The *Hogue* and *Cressy* came up to her assistance, stopped and attempted to save life. A little before 7 A.M. a torpedo struck the *Hogue*. She quickly capsized and sank. At 7.15 the *Cressy* was hit by a torpedo and 15 minutes later by another. Some 1460 officers and men lost their lives. All were sunk by the German submarine *U-9*, a 300-ton boat commanded by Kapitan-Leutnant Weddigen. The ease with which he performed his work was due to a lack of a destroyer screen and the folly of the *Hogue* and *Cressy* in stopping their engines in the known presence of submarines. The frightful loss due to this error caused the Admiralty to issue orders forbidding large vessels to proceed to the assistance of others under such circumstances. See section below on *Convoy*, etc., for methods of fighting the submarine.

During the month of October, the Germans lost a destroyer and a submarine; the British, a submarine, an old cruiser, and the dreadnought battleship *Audacious* by a mine. On November 3, Yarmouth and Lowestoft were bombarded. The armored cruiser, *York*, returning from this service, struck a chain of mines entering the Jahde estuary and was sunk.

On the 16th the German auxiliary cruiser *Berlin* was interned at Trondjem; on the 20th, *U-18* was rammed by a patrol boat and floundered; on the 23d, the German destroyer *S-124* was sunk in a collision with a Danish steamer; and on the 26th, the old British battleship *Bulwark* was blown up in Sheerness harbor, due to some form of interior explosion in which her magazines were involved. On December 16, a German battle cruiser squadron bombarded the cities and harbors of Hartlepool, Whitby, and Scarborough. Nearly 100 noncombatants were killed and 500 wounded. These were not fortified places.

On the morning of Jan. 24, 1915, the fast cruiser fleet in charge of Vice Admiral Sir David Beatty, was patrolling in the North Sea. This fleet consisted of the Fast Battle Cruiser Squadron, *Lion*, *Tiger*, *Princess Royal*, *New Zealand*, and *Indomitable;* the First Light Cruiser Squadron, *Southampton*, *Nottingham*, *Birmingham*, and *Lowestoft;* and two destroyer flotillas. About 7 A.M., the cruiser *Aurora* sighted the German light cruiser *Kolberg* and a destroyer flotilla and at 7.25 action began between them. About this time the German fast squadron (Rear-Admiral Hipper), steering

northwest, was sighted from the destroyer flotillas. This consisted of the battle cruisers *Derfflinger*, *Seydlitz*, and *Moltke* and the large armored cruiser *Blücher*. As soon as the information was signaled to Admiral Beatty, he headed for the enemy, which had changed its course to southeast as soon as it perceived the British battle cruisers. At 8.52, the *Lion* (flagship) opened fire on the *Blucher*, the rear ship of the German column, at a range of a little less than 20,000 yards, but did not get a hit until 9.09. The German vessels began to return the fire at 9.14. The *Blucher* had much less speed than the other German vessels and slowly dropped astern. About 10.48 she fell out of line and turned to the northward with a heavy list. The *Indomitable* was ordered to complete her destruction while the others of the British fleet pushed forward after the main body. At 11.03, the *Lion* received a shell in her engine room which disabled her port engine and she hauled out of action. The *Lion* was towed home by the *Indomitable*. The British squadron was now retiring, having pursued the enemy as close as possible to the areas protected by the mine fields and submarines.

On May 1, 1915, the British destroyer, *Recruit*, was sunk by a submarine and a week later the *Maori*, a much larger boat, was destroyed by a mine off Zeebrugge. On May 27, the British auxiliary cruiser *Princess Irene* was blown up in Sheerness harbor, only one of her crew escaping. Early in July *U-30* was accidentally sunk, but was raised within 48 hours and only one of the crew was found dead.

October 1–4, the Belgian coast was bombarded to assist military operations. On October 28, the armored cruiser *Argyle* ran ashore and was wrecked. On November 4, a German submarine of new type (250 feet long) was captured in a British wire net. On November 17, the hospital ship, *Anglia*, was sunk by a mine in mid-Channel with a loss of 100 lives—chiefly wounded men. On November 28, a German submarine was sunk off the Belgian coast by a bomb from a seaplane. On December 30, the armored cruiser *Natal* was destroyed by an internal explosion while at anchor. On Jan. 9, 1916, the *King Edward VII* was sunk by a mine. This battleship belonged to a class that was one of the last and best of the predreadnoughts.

On May 31, 1916, began the greatest naval battle of the War. About four o'clock in the afternoon the British fast battle squadron of seven battle cruisers and four battleships met the German High Seas Fleet of five battle cruisers and 24 battleships off Jutland on the northwest coast of Denmark. The British engaged the enemy but fell back before the vastly superior force in the direction of their main fleet. In this part of the action they lost the battle cruisers *Queen Mary*, *Invincible*, and *Indefatigable*, and three armored cruisers—all of which were sunk; eight destroyers were sunk during the night attacks. The British Grand Fleet came up about six o'clock, and soon afterward the Germans began to retire, pursued by the British. The action continued until after midnight; the night attacks being those of destroyers and submarines chiefly. The German losses included the battleship *Pommern*, the battle cruiser *Lützen*, four fast cruisers, and five destroyers. The losses of officers and men were about: British, 5000; Germans, 3500; among the British were Rear-Admirals Hood and Arbuthnot. The Germans were favored by misty weather, the close proximity of their own coast (which injured vessels could quickly reach), and by the fact that a few minutes after the arrival of the main British fleet, mist and darkness obscured them from the enemy.

On June 5, 1916, the British cruiser *Hampshire* was destroyed by a German mine near the Orkney Islands. Lord Kitchener of Khartum and his staff, on their way to Russia, lost their lives.

In August, Admiral Scheer, commanding the German High Seas Fleet, made a sortie in force. He first sent out 12 submarines which he posted in two lines of six boats each across the expected track of the British Grand Fleet—one 15 or 20 miles north of the Tyne and one about twice as far to the south of it. On August 18, the High Seas Fleet put to sea. Admiral Jellicoe had received ample warning of the probability of such a movement and had instant report of its actual commencement so that he was able to start south with the British Grand Fleet soon after Scheer got his force formed outside the German mine fields. Some hours later, British Submarine *E-23* hit the dreadnought battleship *Westfalen* with two torpedoes which injured her so seriously that she was forced to return to her base under escort. But Scheer pushed on, six Zeppelins scouting ahead. After meeting Beatty's battle cruiser squadron, Jellicoe placed it 30 miles ahead and continued on a southerly course calculated to intercept Scheer before he could reach the British coast. About 6 A.M. on August 19, Beatty's light cruiser screen ran into the first line of U boats, which was moving slowly northward. The light cruiser *Nottingham* was hit by two torpedoes and, while endeavoring to make port, was sunk an hour later by a third torpedo. Jellicoe immediately turned and headed north for a short time while the submarine menace could be gauged and dispositions made to meet it. About 6.30, the Harwich forces (Commodore Tyrwhitt), which were scouting for the German fleet, sighted its light cruisers and upon steaming towards them soon discovered the enemy's battle fleet. About 10.30, Jellicoe turned south again, Beatty and the cruiser screen ahead as before. At 12.30 Beatty's squadron was abreast Newcastle and only 42 miles from the German battleships. Scheer, informed of the situation by his airship scouts, then turned to the south, driving Tyrwhitt's light forces ahead of him. At 2.35 he changed course to the eastward and headed for the entrance to the Helgoland Bight. The Grand Fleet ran into the second line of U boats about 3.20 and soon afterwards Jellicoe, deeming it impossible to overhaul the German fleet until long after dark—and then in the vicinity of the Helgoland submarine base—gave up the chase. He sent Tyrwhitt to take up a position north of Terschelling and make a night attack if practicable. The latter proceeded in obedience to orders but as conditions were unfavorable he returned without attacking. Soon after the Grand Fleet turned north, about 5 P.M. the U boats made another attack and succeeded in sinking the light cruiser *Falmouth*. Scheer's objective was undoubtedly the British Grand Fleet, provided his submarines could sink or disable enough battleships to reduce its strength materially. As they failed to do so he retired. With two or three times as many sub-

marines in three or four lines he might have succeeded if the first one or two lines had allowed Beatty's force to pass over them without attack. A second sortie was planned for October; but the resumption of the qualified submarine warfare against commerce (with warning, visit, and search) left no submarines available for service with the fleet and the project was given up.

On the night of October 26–27, 11 German destroyers made a very successful raid in the Channel, destroyed the transport *Queen* (no troops on board) and seven drifters, disabled one other destroyer and, although chased and fired upon, escaped into Zeebrugge.

On November 5, British submarine *J-1* discovered a division of German battleships endeavoring to refloat two stranded U boats. She torpedoed and seriously injured the battleships *Grosser Kurfurst* and *Kronprinz* but they were able to get back to port.

About November 25 the German raider *Moewe* made her way through the blockade and was followed on the 30th by the *Wolf*. On Jan. 9, 1917, unrestricted warfare against commerce (see BLOCKADE, SUBMARINE) was ordered to begin on February 1, but this was not publicly announced until January 31. In February, German destroyers made a raid in the Channel but effected no damage. On March 17, a more successful raid took place. One British destroyer and a merchant vessel were sunk and another destroyer disabled. On the same day the raider *Leopard* attempted to pass through the blockade but was intercepted and sunk. About this time the *Moewe* slipped back through the blockade after capturing 27 ships, one of which she sent into Swinemunde.

On the night of April 20 occurred the sharpest fight of the War in which only destroyers and flotilla leaders were engaged. About 12.45 A.M., the flotilla leaders *Broke* (Comdr. E. R. G. R. Evans) and *Swift* (Comdr. A. Peck), constituting the West Barrage patrol, sighted German destroyers on the port bow 600 yards away. These boats, six in number, were of the latest and largest German type and were on their way back from the Dover coast where they had fired a few shots but effected no damage. The *Swift* tried to ram the leader but failed and passed through the German line, firing a torpedo at one of the rear boats; then, turning, she again attempted to ram the leader which once more eluded her and fled with the *Swift* in pursuit. The *Broke* hit the second German boat with her torpedo and opened a furious fire from every gun that would bear. At the same time she turned to port and rammed the third German, her stem remaining in the hole it made. While thus locked together, the crews fought hand to hand as in old sailing-ship days. Of the Germans who attempted to board, two were captured, several killed and the rest driven back. The *Broke* then succeeded in extricating herself and attempted to ram one of the other Germans; while she failed in this she hit the German's consort with a torpedo. They both started away and the *Broke* attempted to follow but a shell partly disabled her engines, so she gave up the chase and, turning her attention to a disabled German, which was on fire, silenced her guns and sank her with a torpedo. The *Swift*, returning, completed the destruction of the boat the *Broke* had rammed. The British lost 22 killed; the bodies of 28 Germans were recovered; 10 German officers and 108 men were saved and made prisoners.

On May 4, the first division (six boats) of American destroyers joined the British fleet and they were followed within 30 days by three other divisions of the same size. By midsummer the numbers had grown to 35 while dozens more were nearly completed and were despatched as soon as they were finished, commissioned, and supplied. This great addition to the destroyer fleet made a real convoy system possible, but it was not until a year later that the production of destroyers had so much more than caught up with the U boat building as to make commerce and the transportation of troops sufficiently safe to insure German defeat.

During the summer of 1917 the British monitors bombarded the German submarine and destroyer bases at Zeebrugge and Ostend but effected no important results. On July 9 the British dreadnought battleship *Vanguard* was utterly destroyed by an internal explosion while at anchor in Scapa Flow. Ten (and probably eleven) Allied warships were lost in this way during the War. Eight, if not all of them, were using some form of nitroglycerin gunpowder. The Americans, French, and Germans—who used nitrocellulose powders—had no such experiences.

On October 17, at early dawn, the weekly convoy between Lerwick, Scotland, and the Norwegian coast was attacked by two German light cruisers. There were two British and nine neutral vessels convoyed by the destroyers *Strongbow* and *Mary Rose*. The destroyers were sunk in a very few minutes, and only two or three of the merchant vessels escaped. Considering the fact that this convoy made a regular weekly sailing each way, the convoying force was inexcusably weak.

On November 2, a German decoy cruiser lying in wait for British submarines was sunk by a destroyer flotilla and on November 17 an indecisive action occurred off Helgoland. The British had been laying mines in large numbers across the German exit channels through their own mine fields and the enemy's mine sweepers were kept busy in maintaining a clear channel An attack on the light cruisers scouting ahead of the mine sweepers was made by a British force consisting of the light cruisers *Courageous* and *Glorious*, several other light cruisers, the battle cruisers *Renown* and *Repulse*, and a number of destroyers. But the German battleships *Kaiser* and *Kaiserin* coming up, followed by the battle cruisers *Moltke* and *Hindenburg*, the British retired.

This was followed, on December 12, by a second attack on the Norwegian flotilla (six vessels) convoyed by the destroyers *Pellew* and *Partridge* and four trawlers. The German force consisted of five or six destroyers. The four trawlers were quickly sunk. The *Partridge* was disabled, captured, and sunk. Her officers and men were made prisoners. The *Pellew*, though chased by three of the enemy, escaped in a rain squall. This second catastrophe led to a change in the Norwegian convoy which had its escort greatly strengthened.

On Feb. 15, 1918, the Second German Destroyer Division made a raid into the Channel from Helgoland Bight, sinking seven drifters and one trawler and injuring three drifters and one mine sweeper. They were not discovered by the patrol until too late and they escaped home-

ward without injury. In another raid from Dunkirk on March 21, the German destroyers were not so lucky. Instead of trawlers and drifters, they met the flotilla leader *Botha* (1700 tons) and the destroyer *Morris* (1000 tons). The *Botha* rammed a German at full speed and cut it in two. A second German was disabled by the fire of the British boats. Shortly afterward the *Botha* was hit by a torpedo that disabled her engines. The *Morris* chased the other German boats into Ostend. On her return she sank the disabled German and took the *Botha* in tow.

On the night of April 22–23 occurred one of the most daring feats of the War. This was an attempt by the British navy to close the inner channels of Zeebrugge and Ostend by sinking in them old cruisers whose holds were half filled with concrete. The force consisted of the old 5750-ton cruiser *Vindictive* carrying a landing party of several hundred sailors and marines; the ex-ferry steamers *Iris* and *Daffodil* carrying some hundreds more, the old 3400-ton cruisers *Thetis*, *Intrepid*, and *Iphigenia*, with holds half filled with concrete; several patrol boats fitted to make a heavy smoke screen; many motor boats and launches for scouting, laying navigation lights, carrying off survivors, etc.; lastly, three destroyers, one carrying Admiral Keyes, commander-in-chief of the district. The destroyers were not expected to join in the blocking operations or in the attack but were designed to keep off German destroyers and to sink any trying to escape. Just at midnight the Zeebrugge breakwater was sighted 400 yards away and the cruisers and ferryboats started in at full speed followed by the small craft. A moment later they were discovered by the enemy who opened on them with heavy and machine guns on the shore and breakwater. In five minutes the *Vindictive* had her bow secured to the breakwater but had to have the *Daffodil* force her stern in on account of the sweep of the tide. The gangplanks—18 in number—were promptly placed but the rolling of the ship made them difficult to use, the men having to jump, drop, or get ashore as best they could, carrying their rifles, machine guns, bombs, etc. Meanwhile the enemy's fire was terrific. The naval captain commanding the bluejackets of the landing party and the colonel commanding the marines were killed before they could get ashore, as were many of their officers and scores of their men. The commander, executive officer, and senior lieutenant of the *Iris* were killed and the officer next in rank was wounded. A shell, exploding between decks among the 56 marines waiting there to go ashore, killed 49 and wounded the other seven. Altogether the *Iris* lost eight officers and 69 men killed and three officers and 102 men wounded. The guns of the *Vindictive* swept the mole and behind their barrage the landing party advanced, driving the Germans before them or into the water. After 15 minutes of desperate fighting the breakwater was cleared, its guns silenced, and the long row of hangars and storesheds set blazing or blown up. An old submarine loaded with explosives was now driven under the viaduct leading to the shore, abandoned and blown up, the Germans who were still firing from the viaduct going up with it. The way was now clear for the concrete ships and 10 minutes later they rounded the end of the mole and drove straight for their objective under fire that was still heavy. The leading ship fouled the wire nets in the channel so she had to be sunk too far out to be of much use, but she cleared the way for the others which were sunk in the narrowest part of the channel, one heading east and one west. It was still possible to work small submarines and torpedo boats around the sunken hulls, but destroyers and large craft were barred. Notwithstanding the heavy fire directed at them practically all of the officers and crews of the concrete ships escaped and were picked up by small craft. The *Vindictive* and her consorts then gathered up their wounded and unwounded and put to sea. Two less well-planned attacks on Ostend failed to secure results of importance.

On Apr. 23, 1918, the German High Seas Fleet made its last sortie. This was directed against the Norwegian convoys which had grown greatly in size and now consisted of 25 to 50 merchantmen with a strong convoying force. The Germans arrived off the Norwegian coast a day too soon to catch the westbound ships and two days too soon to catch those bound to the eastward. The *Moltke* had lost one propeller on the way north and, while being towed back by a battleship, though supposedly covered by the returning fleet, she was torpedoed by a British submarine and seriously injured.

Work on the great northern mine barrage (see MINE, SUBMARINE) began early in the year, but shortage of mines, mine-layers, and men delayed a serious prosecution of the work until the arrival of the American mining squadron in May, with many large mine-layers and vast supplies of mines, permitted the operations to be carried on rapidly.

United States Transport Service. As, at the outbreak of the War, very few American troops were ready for foreign service, the lack of adequate means for the transport of large numbers of officers, men, and supplies was not felt; and the facilities grew faster than the demand for them until May, 1918, when the great rush of troops to stem the German advance strained the capacity of transport to the utmost. The first troops were sent in July, 1917, and the convoy consisted of a few cruisers and transports. The Cruiser and Transport Service was then organized and placed under the command of Rear-Adm Albert Gleaves who rapidly developed it into the most wonderful thing of its kind the world has ever seen. So successful was the convoy system that after its establishment not a single American transport was torpedoed on her eastward voyage when she was carrying troops. On the return trip, with only the crews and a few others on board, three transports were sunk by submarines and one badly injured but able to reach port, total loss of life on the four ships being 138. On the return voyage it was not always practicable to give the same protection as on the eastward trip The total army personnel carried was 2,075,834, of whom about 83,000 were doctors, nurses, hospital attendants, mechanics, and civilians employed in auxiliary services In addition, 5,150,000 tons of cargo were delivered in France and England—artillery, ammunition, aircraft, food, clothing and other necessary military supplies. In July, 1918, 306,500 officers and men were brought over and for the other months of the year from May to October the figures were almost equally large. About half the vessels used were American and half Brit-

ish, but four French men-of-war assisted and several neutral vessels were chartered, principally for carrying supplies.

The German Surrender. The terms of the Armistice required Germany to immediately surrender to the Allies 10 battleships, 6 battle cruisers, 6 light cruisers, 2 light mine-laying cruisers, 50 destroyers of the latest types, and all submarines; all except the destroyers and submarines were designated by name. On November 21, the following vessels surrendered to Sir David Beatty, the British commander-in-chief: 9 dreadnought battleships (*Friedrich der Grosse, Konig Albert, Kaiser, Prince Regent Luitpold, Kaiserin, Bayern, Markgraf, Kronprinz,* and *Grosser Kurfurst*); 5 battle cruisers (*Seydlitz, Moltke, Derfflinger, Hindenburg,* and *Von der Tann*); 5 light cruisers (*Karlsruhe, Frankfort, Emden, Nurnberg, Coln*); 2 light mine-laying cruisers (*Brummer* and *Bremse*), and 49 destroyers. To make up the deficiencies, the dreadnought battleship *Konig*, the light cruiser *Dresden*, and one destroyer were surrendered on December 4, and on Jan. 10, 1919, the dreadnought battleship *Baden* was sent in place of the battle cruiser *Mackensen* which was not ready for sea. The total number of submarines to be surrendered was 158; of these, 87 reported to Rear-Adm. Sir Reginald Tyrwhitt off the Suffolk coast in November; by Jan. 1, 1919, 114 were received.

With the exception of the submarines, all the vessels named or enumerated in the foregoing list were interned in Scapa Flow. The Treaty of Versailles provided that the interned ships be permanently given up to the Allies; that within two months the 8 dreadnought battleships still in Germany should be given up, also 8 light cruisers, 42 modern destroyers, and 50 modern torpedo boats. It further provided that the German navy was thereafter not to possess more than 6 battleships of a predreadnought type, 6 light cruisers, 12 destroyers, 12 torpedo boats, and was to have no submarines. All vessels under construction and not permitted by the foregoing limitations were to be broken up. No vessels were to be built except to replace allowed units of the fleet—battleships after 20 years, cruisers and destroyers after 15 years The personnel, including reserves for the fleet and coast defenses, was not to exceed 15,000 officers and men. As soon as the decision of the Versailles Treaty was understood by the Germans to be irrevocable, and one week before it was signed, at 11.15 A.M., June 21, 1919, upon signal from the *Emden*, the German captains at Scapa scuttled their ships. Only four were salvaged, the *Baden, Emden, Frankfort,* and *Nurnberg*. As partial indemnity for this act of treachery, Germany was compelled to deliver to the Allies 300,000 tons of floating docks, her remaining light cruisers (*Graudenz, Konigsberg, Pillau, Regensburg,* and *Strassburg*), and 42,000 tons of floating cranes, dredges, and tugs.

Naval Vessels of All Combatants Lost or Destroyed. The accompanying table gives the numbers of the most important vessels (arranged in classes) lost by each of the belligerent navies from Aug. 1, 1914, to Nov. 11, 1918, not including any vessels surrendered by the Armistice or by peace treaties. The abbreviations used signify as follows: D B., dreadnought battleship; P. B., predreadnought battleship; B. C., battle cruiser; A. C., armored cruiser; L. C., light cruiser or protected cruiser; D., destroyer; S., submarine. Numbers marked with an asterisk (*) are approximate.

Nation	D. B.	P. B.	B. C.	A. C.	L. C.	D.	S.
United States	...	...	....	1	....	2	2
Great Britain	2	11	3	13	16	64	54
France	...	4	....	5	. .	13	13
Italy	1	2	.	2	2	9	7
Japan	1	. .	..	1	3	2	.
Russia (to 1-1-'18)	2	2	....	2	1	18	15 *
Germany	....	1	1	6	17	68 *	208 *
Austria	2	1	....	.	3	6	11 *
Turkey		2			1	3	

The merchant ships of the Allies and neutrals sunk by submarines during the course of the war totaled 4837, divided by years as follows: 1914, 3; 1915, 396; 1916, 964; 1917, 2439; 1918, 1035. During the same period surface craft sank 177 merchantmen, and mines accounted for 497 vessels The total tonnage of the ships sunk by submarines, surface craft and mines amounted to 12,739,000. The peak year was 1917, when more than 6,000,000 tons were sunk. According to British Admiralty reports, 189 enemy submarines were sunk.

Convoy and Other Antisubmarine Defense Measures. The principle of protecting noncombatant vessels by means of accompanying warships is as old as recorded history and has been used to some extent in almost every naval war. In the great War, for various reasons, its adoption was delayed—except for cross-Channel transport—until the submarine sinkings reached a point that demanded the better use of every method to reduce the destruction. The system of patrolled routes in which cruisers, destroyers, and patrol vessels moved back and forth along the lines of traffic was found to be wholly ineffective. General convoy was opposed by the British Admiralty, the officers of the Grand Fleet, and owners and captains of merchant vessels. Suitable escort vessels were inadequate in number, and so many destroyers—by far the most efficient escort craft—were needed for naval operations that few were left for other purposes; but the urgency of the situation forced the naval authorities to detach as many of them from the fleet as could possibly be spared. The owners of fast merchant vessels agreed, after considerable grumbling, to the delays made necessary by convoy, and the dissenting captains were forced to accept the convoy system, which entailed much additional care in steering, speedkeeping, etc. The available British destroyers were reinforced in May, 1917, by 24 from the United States Navy. Additional ones were constantly arriving from the United States and new British boats were being completed so that, notwithstanding the withdrawal of many United States boats to protect American troopships, the number available for general British convoy increased from 29 in January, 1917, to 139 in November, and continued to grow. After the system got in full working order in the summer of 1917, the amount of ton-

nage sunk each month, with some slight fluctuations, decreased steadily to the end of the War.

In most convoys the train (i.e. the vessels being convoyed) consisted of 12 to 40 ships—preferably 25 to 35—arranged in three or more columns. The distance between ships in each column was usually 500 yards and the interval between columns 800 yards, but these figures were sometimes increased in bad weather or under special circumstances The escort of the earlier convoys consisted of two destroyers, a wholly inadequate force which offered no protection against the weakest of German cruisers or destroyer divisions (usually five boats) and very little against submarines. Cruisers, acting as a covering force for the convoy, were always on patrol in its vicinity, but they frequently failed to arrive until after the escorting destroyers had been sunk or driven off and a heavy toll taken of the ships convoyed. Later convoys had an escort of 6 to 12 destroyers distributed ahead, on each beam, and astern. British convoys were assembled in certain ports and placed in charge of a naval officer, called "commodore of convoy," who took passage in one of the ships with his staff and returned in the escort when the convoy broke up 200 to 400 miles off shore. He received reports of danger and directed the course, speed, and steering. The American troopship convoys were usually accompanied by a regular naval cruiser, the captain of which acted as commodore of convoy. As the captains of most of the troopships were officers of the navy or of the naval reserve, a high degree of convoy efficiency was obtained and this was an important factor in the wonderful success of the work. The "zig-zag" method of steering used when in submarine-infested waters, or when a submarine was sighted, consisted in an irregular and frequent change of course of one to two points on either side of the regular course. This seriously interfered with a submarine's calculations and compelled it to get very close to the target (and therefore within easy sight and range of the destroyers) in order to have any reasonable probability of scoring a hit. Another means of deceiving the submarine as to the course steered by a vessel was camouflage painting, which also added much to the difficulty of sighting a ship and identifying her character; for these reasons it was very generally adopted by both war vessels and merchant ships. A camouflaged ship resembled a huge futurist painting of nothing in particular, the stripes, areas, colors, and lines so breaking up the picture as to render it almost impossible to make out the actual contours of the hull and upperworks except at close range or under exceptional conditions of light and background. Smoke screens, much used by destroyers in naval actions, were occasionally employed by merchant vessels, especially when not under convoy. They were produced by special handling of the fires under oil-burning boilers or by chemicals.

Operations in the Baltic. As soon as the relations with Russia became strained, German ships began to patrol the coast from Memel to the Gulf of Riga. Mine laying by Germany and Russia began in the Baltic at least as early as in the North Sea. On August 27, the German cruiser *Magdeburg* ran ashore in a fog on the Island of Odensholm and was blown up to avoid capture by an approaching Russian naval force. On December 12, the German armored cruiser *Friedrich Karl* was sunk by a mine and on the 25th the old cruiser *Hertha* and a mine layer were attacked by Russian cruisers and sunk. The Russian submarines were now becoming effective and, notwithstanding the ice, were cruising in the Baltic, although the ice interfered with prosecuting operations of importance during the remainder of the winter and in the early spring.

On July 2, 1915, a Russian cruiser squadron drove off a German light cruiser and several destroyers and forced the mine layer *Albatross* to run ashore in a sinking condition. British submarines had now reached the Baltic in considerable numbers, passing under the mine fields or through the Sound and along the Swedish coast. Their presence acted as a strong check on German operations, especially after the German armored cruiser *Prinz Adalbert* was sunk (October 23) off Libau. On November 7, a British submarine sank the German cruiser *Undine*, and on December 19, another submarine sank the *Bremen* and a torpedo boat.

No operations of importance occurred during 1916 and early in 1917 the Russian Revolution left the control of the Baltic entirely in the hands of the Germans.

Operations in the Mediterranean. On the day after war was declared, the German naval force in the Mediterranean bombarded undefended seaport towns in Algeria, the battle cruiser *Goeben* firing upon Philippeville and the light cruiser *Breslau* upon Bona. These cruisers arrived in the Dardanelles on August 10. To avoid immediate trouble for the Ottoman authorities they were supposedly sold to Turkey and renamed *Sultan Selim Javuz* and *Medillu*, but they continued in command of German officers and retained a part at least of their German crews.

On August 9, Austria declared a blockade of the Montenegrin coast and bombarded Antivari. About the same date French and British fleets established a blockade of the Austrian coast at the Strait of Otranto. The Austrians had placed mine fields all along their coast. About the middle of August, Allied forces swept up the Adriatic, driving the Austrians to the northward. They then attempted to take Cattaro for a naval base, but lacked the military force for a garrison and shore operations, and therefore failed.

The peculiar behavior of Turkey and the mining of the Dardanelles caused a British force to be maintained in that region. While on this duty the armored cruiser *Warrior* ran ashore and was injured on September 7. On the 10th, Turkey abrogated the capitulations with foreign governments and during the latter part of October permitted her vessels to sink Russian ships of war and to attack Odessa. De facto war was begun by the Entente Allies on November 1. On November 21, the French submarine *Curie* was sunk while scouting along the Austrian coast On November 24, Italy landed a force at Avlona to assist her protégé Essad Pasha against the Albanian insurrectionists.

On February 24, 1915, the French destroyer *Dague* was sunk by a mine off Antivari. On April 26, the French armored cruiser *Léon Gambetta* was torpedoed by the Austrian submarine *U-5* and sank in 10 minutes.

On May 24, Italy declared war on Austria; on the same day Austrian torpedo boats, sup-

ported by the light cruiser *Novara*, made a raid on the Italian coast, where they were first met by Italian destroyers and finally driven off by Italian cruisers. The Italian destroyer *Turbine* was sunk early in the action. On June 10, the Italians captured Monfalcone with its shipbuilding yards. The advent of Italy into the War completed the control of the Adriatic by the Entente Allies and, on July 6, Italy clinched the situation by a proclamation closing it to all merchant vessels not possessing special permits. Operations of the Austrian submarines were much hampered by the destruction of their base on Lagosta Island by the French destroyer *Bisson*.

On September 28, a fire broke out on the Italian battleship *Benedetto Brin* while she was lying at anchor in Brindisi harbor. The fire was quickly followed by an explosion which destroyed the ship.

During the month of December, 1915, the Italians landed a large force of troops in Albania. The expedition was most efficiently guarded against submarines and the only losses were the destroyer *Intrepido* and the troopship *Ré Umberto*, which struck drifting mines. In January, 1916, a cruiser of the *Novara* type was sunk by the French submarine *Foucault*.

The Italian dreadnought, *Leonardo da Vinci*, blew up in the harbor of Taranto on August 2. The British transport, *Franconia*, was torpedoed on October 5, and on October 9, the French auxiliary cruiser, *Gallia*, was similarly sunk. The British ship *Britannic* was sunk by a mine in the Ægean Sea on November 21. On December 11, the Italian battleship, *Regina Margherita*, struck a mine and sank and 675 lives were lost.

The naval operations in the Adriatic during the year 1918 were very active. On Dec. 9, 1917, Italian torpedo boats made a raid on Trieste, and sank the small battleship *Wien* (5500 tons), and injured another of the same class. On April 22, in a fight between two British and five Austrian destroyers, the former were reenforced, and the latter retreated to Durazzo, with the British in pursuit. On June 10, 1918, the Austrian battle fleet of four dreadnought battleships, accompanied by cruisers and destroyers, while on its way to make a demonstration in force against the Otranto barrage, was attacked by two small Italian torpedo boats which sank the battleship *Szent Istvan* and seriously injured the *Prinz Eugen*, a sister ship.

Operations in the Black Sea and Dardanelles. The first operations took place on October 29, when the Turkish squadron, including the *Sultan Selim Javuz* (ex-*Goeben*) *and Medillu* (ex-*Breslau*) bombarded several Russian ports. A destroyer entered Odessa harbor, torpedoed and sank the gunboat *Donetz* and badly injured the *Kubanetz* (a sister to the *Donetz*), and four merchant steamers. On the same day the *Medillu* bombarded Theodosia, seriously injuring the cathedral and other buildings. On their way to Sebastopol the Turkish destroyers sank the Russian mine layer *Pruth*. The next day (October 30), accompanied by destroyers, the *Sultan Selim* bombarded Sebastopol. By the return fire of the forts she was so badly injured that the admiral collected the squadron and returned to Constantinople.

During January, 1915, the Russian fleet sank several Turkish vessels in the Black Sea, including a number of troopships and transports, and shelled the Turkish naval station at Sinope. On the 17th the French submarine *Saphir* was sunk by a mine in the Dardanelles. About the middle of February, the combined British and French fleets began their fruitless attempt to force a passage of the Dardanelles. No operations in the whole course of the War were so poorly conceived and so inefficiently carried out. It is hard to understand the folly of the British government in embarking upon such an expedition. If there is one thing that is well understood in naval war it is the absurdity of attacking strong forts by ships, especially without adequate military support. Even if the ships can drive out the garrison it will return as soon as the bombardment ceases. Unless the fortifications are badly placed, they cannot be wholly destroyed and the ravages of bombardment can be largely restored by a few days' work. Permanence of victory can only be obtained by occupying the works as soon as the defenders are expelled (see MILITARY OPERATIONS).

As already stated, the operations began in February. Several bombardments of the forts were carried out and considerable injury inflicted upon them. The ships, much hampered by bad weather outside, then entered the straits for closer work. On March 18, the British battleships *Ocean* and *Irresistible* and the French battleship *Bouvet* were sunk by mines and the British battle cruiser *Inflexible* badly injured by gun fire. The plan of forcing the passage by battleships was then given up, and the second phase of the operations soon began. Late in April the British and French troops were landed under fire at the Dardanelles. On May 12, the British battleship *Goliath* was sunk by a Turkish destroyer in a night attack; the battleships *Triumph* and *Majestic* were sunk by submarines a few days later, the former on the 25th, the latter on the 27th. The British submarines were very active at this time in the Black Sea and Sea of Marmora, sinking many vessels, chiefly transports and troopships, but on August 8 they sank the old Turkish battleship *Kheyr-ed-din Barbarossa* and the Turkish gunboat *Berk-i-Satvet*. In June, the German *U-51* was sunk in the Black Sea and the German submarine base at Smyrna destroyed.

About August 1, the French submarine *Mariotte* was sunk. During the summer many British transports and troopships were destroyed by German submarines, the most important being the troopship *Royal Eduard*, which was sent to the bottom on August 14 with the loss of 800 lives; but the sinking of the troopships *Ramazan* (British) and the *Marquette* (French) were disasters almost equally great. In the Black Sea the Russians seemed to have been unable to blockade or capture the *Medillu* (ex-*Breslau*) or the *Hamidieh*. In October, the *Sultan Selim Javuz* (ex-*Goeben*) appeared again in the Black Sea but accomplished nothing of importance and seemed to be partly disabled.

The Dardanelles operations were now admitted to be a failure, and the British began to transfer their troops to Saloniki. The operations in the Black Sea still continued but by the summer of 1916 had become of no special importance, since the Turkish navy had for a time been reduced to impotence. On Oct. 20,

1916, the *Imperatritsa Marie*, a Russian dreadnought, blew up.

At the outbreak of the Bolshevik revolution, many of the officers and men of the Black Sea fleet refused to recognize the authority of the Bolshevik leaders, Lenine and Trotsky. This resulted in several battles between the two factions which usually ended disastrously for the anti-Bolshevik men. The ships were surrendered to the Germans on June 10, 1918. The Turkish cruiser *Medjidieh*, which had been sunk in action, and afterwards raised and repaired by the Russians, was returned to the Turks.

Cruiser Operations in Atlantic, Pacific, and Indian Oceans. At the outbreak of war the only German vessels beyond the reach of home ports were the battle cruiser *Goeben*, the armored cruisers *Scharnhorst* and *Gneisenau*, the fast cruisers *Karlsruhe*, *Breslau*, *Emden*, *Dresden*, *Nurnberg*, *Konigsberg*, *Leipzig*, and *Breslau*, and a number of small cruisers and gunboats. To these were quickly added several fast merchant steamers, the *Kaiser Wilhelm der Grosse*, *Kronprinz Wilhelm*, *Prinz Eitel Friedrich*, *Cap Trafalgar*, and *Spreewald*. These had their armaments on board or in German colonial ports.

The operations of the *Goeben* and *Breslau* are described elsewhere in this article. The *Scharnhorst* and *Gneisenau* were, after the *Goeben*, the most important vessels on the list and were under the command of Vice Admiral Count von Spee, the only German flag officer outside of European waters. After the commencement of hostilities these vessels were first heard of at Tahiti, where they bombarded the port of Papeete and sunk the French gunboat *Zélée*. The *Nürnberg*, after cutting the America-Australia cable at Fanning Island, joined Von Spee's squadron. He then proceeded to the west coast of South America, where he met the *Dresden* and *Leipzig*. On the afternoon of Nov. 1, 1914, Rear-Adm. Sir Christopher Cradock, with a squadron consisting of the armored cruisers *Good Hope* and *Monmouth*, the fast light cruiser *Glasgow*, and the armed merchant steamer *Otranto*, was off the Chilean coast searching for German cruisers. The old battleship *Canopus* was near at hand and proceeding to a rendezvous to join the squadron. About 4.20 P.M. smoke was seen to the northward and soon afterward Von Spee's squadron, consisting of the *Scharnhorst*, *Gneisenau*, unarmored cruisers *Dresden*, *Leipzig*, and *Nürnberg*, was sighted heading south. At 7.03, the enemy opened fire at about 11,500 yards, quickly followed by the British. The superiority of the German ships was at once apparent. At 7.50 a tremendous explosion occurred on the *Good Hope* amidships, the flames reaching an altitude of 200 feet. The *Monmouth* was already out of action, down by the head, and leaking badly. Darkness and a rain squall coming up made the pointing of the guns very difficult, so Von Spee signaled the light cruisers to attack the enemy's ships with torpedoes. The *Good Hope* could not be found and had probably gone down, but the *Nürnberg* discovered the *Monmouth* and, by gun fire at close range, caused her to capsize. In the darkness and thick weather the *Glasgow* and *Otranto* got away without difficulty.

The British Admiralty immediately took steps to meet the situation by secretly despatching a squadron under Vice Admiral Sturdee in pursuit of Von Spee. This consisted of the battle cruisers *Invincible* and *Inflexible*, the armored cruisers *Carnarvon*, *Cornwall*, and *Kent*, the fast cruiser *Bristol*, and the *Macedonia*, supply steamer. At some rendezvous on the South American coast they were joined by the *Canopus* and *Glasgow*. About 8 o'clock on the morning of December 8, while Sturdee was coaling in the Falkland Islands, the leading ships of the German squadron were sighted. Knowing nothing of the battle cruisers, the Germans came leisurely on, apparently intent on destroying the wireless station. At 9.20, they were within 11,000 yards, and the *Canopus*, still at anchor, opened fire on them over the lowland. They then turned to the southeast to rejoin the main body which immediately proceeded to the eastward at full speed At 9.45, the British squadron came out and started in chase. About 1 P.M. the *Invincible* and the *Inflexible* began firing on the rear ships of the German column and a little later were able to reach the armored vessels and leave the others to the cruisers. At 4.04, the *Scharnhorst* began to list heavily to port and at 4.17, sank with all hands. The *Gneisenau* continued the hopeless fight, though after 5 o'clock she was hors de combat. At 6 P.M., she heeled very suddenly and sank. Of the German light cruisers, the *Leipzig* was sunk by the fire of the *Glasgow* and *Cornwall* about 9 P.M., and the *Nürnberg* by that of the *Kent* at 7.27. The *Dresden*, which escaped, was discovered off the island of Juan Fernandez on Mar. 14, 1915, by the *Glasgow*, *Kent*, and auxiliary cruiser *Orama*. After an action of five minutes' duration she surrendered, but was on fire and soon afterward blew up.

Of all the German cruisers the *Emden* had the most spectacular and successful career. On August 1, she left Tsingtao. During her remarkable career of 94 days, the *Emden* captured or sank 30 vessels, destroyed $25,000,000 worth of the enemy property, almost paralyzed the commerce of the East, and had 19 war vessels of the enemy seeking her. She was finally compelled to run ashore on the Cocos Island by the *Sydney* on November 9.

The *Konigsberg* was less successful. After a cruise of two months along the South African coast, in which she destroyed several British merchant ships and the small cruiser *Pegasus*, she was blockaded in the Rufiji River, German East Africa, where she was destroyed by a British expedition on July 11, 1915.

Of the German armed merchant steamers, the *Spreewald* was captured by the armored cruiser *Berwick* on September 12. The *Kaiser Wilhelm der Grosse* had a still shorter career, being sunk on Aug. 27, 1914, by the British cruiser *Highflyer*. On October 14, the *Cap Trafalgar*, which was beginning to interfere with the British trade to South America, was sunk by the British armed steamer *Carmania*, late of the Cunard line. The *Kronprinz Wilhelm* and the *Prinz Eitel Friedrich*, after long and successful cruises as commerce destroyers, entered United States waters and were interned at Norfolk.

Immediately after war was declared, the Entente Allies began perfecting arrangements for the capture of German colonies. On August 7, Togoland was seized by land forces. On August 27, Japan declared a blockade of Kiaochow, and on November 7, Tsingtao, the German stronghold in China, surrendered to the Allied

forces, chiefly Japanese. Early in August, a New Zealand expedition sailed for Samoa. At Noumea, the convoy, which was a weak one, became strengthened by the battle cruiser *Australia* and the cruiser *Melbourne* of the Australian navy, and the French armored cruiser *Montcalm*. The expedition arrived at Apia on August 29 and the German governor surrendered at once, as he had practically no means of resistance. On its return from Samoa, the Australian squadron captured Herbertshohe, the capital of the Bismarck Archipelago, and, on September 27, took possession of the town of Friedrich Wilhelm in Kaiser Wilhelmsland (German New Guinea). During September and October, Australian and Japanese expeditions seized the remaining German possessions in the Ladrone, Marshall, and Caroline Islands.

For a technical discussion see NAVIES; BLOCKADE, SUBMARINE; BOMB, DEPTH; MINE, SUBMARINE; ROSYTH; SCAPA FLOW; GUNNERY, NAVAL; MINE, SUBMARINE; VESSEL, NAVAL.

AËRIAL OPERATIONS

The outbreak of the War found the Great Powers of Europe ready and anxious to make immediate application of aëronautics to their respective military and naval operations. That all were inadequately prepared on the score of equipment and trained personnel the opening weeks of the war soon showed, and early the demands likely to be made on the aërial services were clearly indicated. But in no field did developments follow more rapidly, and as early as the Germans undertook the invasion of Belgium and France it was realized that aëroplane and airship had worked materially to change the nature and scope of military operations and to render obsolete tactics and movements that long had prevailed in warfare. By affording to scouts and intelligence officers a complete view of the enemy's territory, the disposition and movement of his troops and fleets, and his permanent or even most temporary defenses, surprise or flanking movements were rendered practically impossible. With both sides adequately informed as to the forces of their adversaries through constant aërial scouting and reconnoissance, the tendency towards trench fighting and the protracted sieges and bombardments of the Western front was as pronounced as it was inevitable. The direction and control of fire from an observation or kite balloon or aëroplane early became an indispensable feature of the work of the artillery. The tactical changes wrought by the use of aircraft were stupendous, and the service of security and information by aërial observers and range finding for the artillery became essential features of the everyday work of the forces in the field. In addition there were raids by aëroplane and airship to drop explosive or incendiary bombs on fortified positions, moving columns, railway trains, supply dépôts or munitions works, or on warships, submarines, and transports.

Such activities on the part of the airmen soon became so valuable in a military sense that the prevention of these efforts was essential, and this naturally led to the development of the purely combative side of aërial warfare, which soon passed from individual duels in the air to savage actions often at close range participated in by a number of aëroplanes of different types, where battle tactics of an elementary form were evolved as a result of training and drill to secure harmony of action.

Naturally this led to increased armament and armoring of the aëroplanes, and the calibre of the rapid-fire gun that soon took the place of the automatic pistol became greater, so that an air battle was indeed a serious matter, and the protection of fuel tanks and machinery and the design of machines to withstand as much penetration of the wings as possible figured prominently, as indeed did the entire question of design and construction for power, carrying capacity, speed, ease of manœuvring, and general reliability. Remarkable advances were realized, together with wholesale demands which taxed the facilities for manufacture in the belligerent nations as well as in America.

Flying corps existing in armies and navies on the outbreak of the War were greatly augmented and preparations made to train vast numbers of aviators. It was estimated that the various belligerent nations at the outbreak of the War possessed about 5000 aëroplanes and 109 dirigibles. Naturally Germany, where 12 Zeppelins and about 23 Parseval and Gross airships and about 1000 aëroplanes were available at the beginning of the War, was preëminent as regards numbers and trained pilots and observers, but here the policy of standardization and organization contributing so much to her efficiency in other fields was not of corresponding avail. A year's service, even less, demonstrated that much of the equipment so carefully assembled and standardized soon became obsolete and inferior with respect to the rapid developments that war conditions were bringing out for the Allies.

While the Germans had trained men in their aviation corps, the French, with perhaps 31 airships of nonrigid or semirigid types and possibly 1200 military aëroplanes of different designs, had fewer enrolled aviators at the outbreak of the War in actual service, but had a large number of expert civilians and their machines to call upon, so that soon there was organized a body of men whose equipment, both available and rapidly supplied, represented the note of progress ever peculiar to the French in this field. The organization and drill of the various units was done with remarkable military skill and care.

Great Britain, distinctly inferior in organization and equipment as well as numbers, for its aëroplanes hardly totaled 500 and its dirigibles but 15, at the beginning of the War endeavored speedily to repair these deficiencies, and while the defensive efforts to repel the Zeppelin raids were crowned with but moderate success, British aviators at the front and at sea achieved a good record. Russia, with 16 small airships and perhaps 800 aëroplanes, many of which were in poor shape, suffered from inadequacy of equipment, while in Austria and Italy from the outset aërial war was waged by both powers with a fair degree of preparation.

Aërial activities in war became not only important but indispensable under modern conditions, yet it did not have a direct and primary effect on the progress of the War itself, comparable, let us say, to the activities of the submarine. Indirectly the influence of aircraft on warfare proved enormous, but four years of experience indicated that there was but little direct military advantage in the attempts at

wholesale destruction of noncombatants, buildings, and material, by airplanes and dirigibles. The numerous air raids over Great Britain resulted in little positive military advantage and the "frightfulness" that they were to inspire soon gave way to a feeling of intense irritation on the part of the invaded.

1914–15. In the early weeks of the War, a Zeppelin dropped bombs over Antwerp, and at the end of August and on Sept. 1, 2, and 3, 1914, Taube monoplanes made daily visits to Paris, where, as in London, all street and other lights were extinguished and means hastily improvised to defend the city by searchlight and anti-aircraft guns, as well as to organize special fire-fighting facilities to deal with the results of incendiary bombs. On Oct. 11, 1914, another raid was made on Paris and bombs were dropped, some of which fell on the Cathedral of Notre Dame, while others damaged streets, sewers, and the underground railway, besides causing the deaths of three persons and injuries to 14. In the meantime the aërial defense of the city was being developed, but on Mar. 22, 1915, another raid was made on Paris, which, while resulting in little damage, nevertheless emphasized the need of a more complete system of defense. This was organized under General Hirschauer, former chief of the aëronautical department, and after it had been developed, Paris was free from attacks for many months.

Naturally an air attack on the British Isles was the goal aimed at by the Germans. Various reconnoissances were made by the Germans in connection with the flights on the Western front and the observation of the British navy. The first serious raid on Britain was on the evening of Jan. 19, 1915, and was directed against Yarmouth, Sandringham, and other points of the Norfolk coast. This raid was but a beginning, for on the night of May 31, 1915, the metropolitan section of London was reached and considerable damage was done, 41 lives being lost, while on June 6, another raid attended by 24 casualties was made on the east coast of England, and again on June 15, on this last 18 persons being killed and 40 injured. The attacks of the Zeppelins reached, perhaps, a climax on September 8–9 when the heart of London was reached, and the Zeppelins flying over Trafalgar Square were distinctly visible from the streets. The casualties of this raid were given as 20 killed and 88 wounded. The material damage was considerable. These raids continued during September over parts of the eastern counties. On October 13–14, London was again attacked by Zeppelins which, fearful of searchlights and gun fire, flew very high with a corresponding effect on the accuracy of their bomb dropping. The roll of casualties included 71 killed and 178 wounded. For a few months there was a lull in the air attacks on Great Britain, but the most serious raid came on the night of Jan. 31, 1915, when nine Zeppelins passed over the midland counties, dropping over 300 bombs. Here 71 were killed and 101 injured.

1916. Beginning Mar. 31, 1916, air raids were made over Great Britain for five successive nights and not only the eastern counties but even Scotland and the northeast coast were visited and bombs dropped. In one of these raids the Zeppelin *L-15* suffered severely from gun fire and was forced to descend and was captured by the British.

The aërial defense of Great Britain came in for considerable criticism both within and without Parliament and unfavorable comparisons with that maintained in France were made. Many Englishmen urged that too much had been done for defense and not enough in the way of offensive movements against the Zeppelins in their home ports and stations.

Such raids as these described stand out apart from their actual military significance, but they must not be allowed to eclipse the daily routine and the ever-increasing number of frequent combats on all the battle fronts of this great War. What was remarkable at the beginning of the War, such as visits of the German Taubes to Paris in August, 1914, or the bomb dropping by a Zeppelin on Antwerp on September 1, of the same year, soon became commonplace as did the bombing of the German hangars at Düsseldorf and Cologne by the Allies later in the month. Attacks on Friedrichshafen by the British and on Freiberg by the French followed, while a British raid on Cuxhaven on Dec. 25, 1914, was an early example of a number of aëroplanes working together. Air attacks and reconnoissances in force became more frequent, ever on a larger scale and with more elaboration of organization as well as with more powerful and more heavily armored machines. Bombing raids by aëroplanes were organized on a large scale by the French, especially with their heavier machines, and many of these were very successful. While both sides continually lost many aëroplanes in actual fighting, the Germans suffered severely with respect to their Zeppelins by accident as well as by gun fire.

Along with brilliant feats of individual aviators there was developed a tendency towards tactical formations and the use of many machines. Aëroplanes were assembled for flight over the enemy lines, difference in speed and armament making possible tactical dispositions of the greatest advantage. The Germans for a time had some machines of superior armament, and from August, 1915, heavier guns and armored aëroplanes figured and operations by flotillas became more general, these including the use of powerful bombing machines accompanied by armored scouts for their protection, and swift flying machines for reconnoitring. Aircraft were also used at sea against warships. Aëroplanes were also in evidence in the south and east, for the Russians attacked Constantinople in August, dropping bombs on the harbor forts, and from this time both sides were in active aërial warfare until the close of the Dardanelles campaign. The Austrians were active against Italy, and bombing raids were made against Brescia, Verona, Venice, Udine, and other points while the Italians in turn made attacks on Austrian territory.

Everywhere there was aërial activity and damage wrought by aëroplanes, yet unavoidably this was accompanied by wholesale destruction of machines and lives of aviators. As samples of air attacks, and in fact but little more here can be attempted, mention may be made of the bombing of a poison gas plant at Dormach on Aug. 26, 1915, by a French aviator, and a bomb attack on the royal palace at Stuttgart, a step, it was announced, taken in retaliation for German bomb dropping on unfortified towns and civilians. In every kind of operations aircraft aided, as at the battle in the attack on Artois, Sept. 25, 1915, when the British airmen

were prominent, and later at Verdun in the spring of 1916. Typical of a day's work for the airmen may be mentioned the British War Office report of Dec. 19, 1915, which announced 44 combats in the air on the Western front.

In 1916, everywhere there was increased aërial activity, a more active patrol service was maintained, and actions were frequent and serious. At sea aëroplanes were searching for submarines and scouting, and employment of airships and aëroplanes before and in a large naval battle for scouting and reconnoissance in a manner and on a scale somewhat corresponding to their use on land found a notable opportunity in the great fight off Jutland on May 31, 1916.

1917. In the battle of the Somme and during the great German retreat, General Haig depended on his air service to find out just what the Germans were doing and how far they had retreated. We find the aëroplane possibly used to its greatest advantage in the spring and summer campaigns on the Italian front and during their retreat to the Piave. Fleets of 150 or more machines would fly low to the ground and drop bombs on forming troops, lines of communications, munition dumps, or they would rake the enemy with machine-gun fire. One of the interesting outgrowths of increased air activity was the developing of the "camouflage" system. This means the covering of trenches, artillery and other things of military value with trees, painted scenes, etc., so that they could not be distinguished from the rest of the landscape from the air. This was of particularly great value because aëroplanes were compelled to stay 2 or 3 miles in the air as anti-aircraft guns were improved.

England was the scene of many raids during 1917. Only the more important will be noted here. Between May 23 and June 16, five air attacks were made. In almost all of these the Germans used aëroplanes instead of Zeppelins. In one attack, on May 25, 76 were killed and 174 wounded. The worst raid of the month was on June 13. It was carried out in broad daylight over London and resulted in the death of 159 persons and the wounding of 424. London was again attacked by a fleet of 24 aëroplanes which penetrated all the defenses (July 4); 37 were killed and 141 injured. On August 22, Yorkshire, Dover, Ramsgate, and Margate were raided. The Germans suffered heavily in this raid, losing eight Gotha machines. On the moonlight night of September 4, nine were killed and 62 injured in a raid on London. The defenses of London were now in much better shape and the Germans were compelled to give up their daylight attacks.

Raids were made on England on September 24, 25, 29, 30, and October 1. As a result of these, 52 were killed and 216 injured. The Germans carried them out with scarcely any loss to themselves, the British claiming only to have destroyed two machines. One of the most disastrous raids from the German point of view was made on the night of Oct. 19, 1917. At least 11 Zeppelins participated and on their way home, four were lost in French territory. One was captured undamaged at Bourbonne-les-Bains. On December 6, 25 Gotha planes attacked London, killing 10 and injuring 31. On December 18, 20 aëroplanes raided Kent, Essex, and London, killing 10 and wounding 70. In these last two raids, three planes were forced to descend, and their crews were taken prisoner.

The consensus of opinion among the Allied nations was that these raids were of no military value and were merely another form of Germany's "frightfulness." Public opinion in England demanded reprisals, but for physical reasons the government refused to heed the popular clamor. Instead they gave their attention to the air bombardment of purely military centres such as the submarine bases at Ostend and Zeebrugge and the Krupp works at Essen. France made one or two spasmodic attempts to retaliate by bombarding towns in Alsace and Lorraine, but met with comparatively little success.

With the entrance of the United States into the War, it was felt that as soon as her resources were available the supremacy of the air would pass once and for all to the Entente Allies. She devised the standardized Liberty motor which was supposed to contain in one engine all the best points secured by foreign designers.

1918. On the nights of Jan. 21 and 24, 1918, British aviators carried out successful raids over Belgium and in German Lorraine, dropping bombs on Mannheim, Treves, Saarbrücken, and Thionville. During the month of January the Germans and Austrians were particularly active in carrying out raids over the Italian lines. Treviso and Mestre were bombarded on January 26; Venice, Padua, Treviso, and Mestre, on February 4 and 6, and on the latter date Calliano and Bassano were also bombed.

London was attacked on the night of January 28 and 58 persons were killed and 173 wounded. Another raid the next night killed 10 and injured the same number. On the 30th, Paris was heavily bombarded; 45 persons were killed and 207 wounded. During a raid on Venice on February 26, the Churches of Santa Giustina, San Simeone, Piccolo, and St. John Chrysostom were badly damaged. Naples was attacked on March 11. This resulted in the killing of 16 and the injuring of 40. A raid on Paris on Mar. 8, 1918, resulted in the death of 13 and the injuring of 50. Another raid which occurred on March 11 caused the death of 34 and the injuring of 79. Four German machines were brought down and 15 Germans killed or captured.

Italian aviators coöperating with the Allies on the Western front bombed Metz on Mar. 17 and 23, 1918, and raided the railway station at Thionville on the night of March 24. Paris was again the objective on April 12, when 26 were killed and 72 wounded. Italians raided Pola, Trent, and Trieste on May 10, and British forces coöperating with them attacked the aviation grounds at Campo Maggiore (May 4) and destroyed 14 machines.

On May 3, 1918, the British bombarded Karlshütte and on May 16 brought down five German machines during an attack on Saarbrücken. British seaplanes attacked Ostend, Westende, and Zeebrugge successfully on May 6. London was again attacked on May 19, with a casualty list of 44 killed and 179 wounded; the British succeeded in bringing down five German aëroplanes. In an air raid over Cologne on May 18, 14 persons were killed and 40 injured. Raids were carried out by the Allies over railway stations in Lorraine and on a factory in Mannheim on May 21 and 22. The rail-

way station was destroyed and 26 persons were killed in Liége on May 26.

On June 14, 1918, the first American bombing squadron to operate behind the German front raided the Baroncourt Railway and returned safely. A second raid was carried out the same day when Conflans was attacked. On the night of Oct. 9, 1918, an expedition of more than 350 planes bombarded many towns in the American sector, with the loss of only one man. American activity in the Argonne sector was particularly noticeable. During a six-month period before the signing of the Armistice it is estimated that the American fliers brought down over 500 planes with a loss of about 70.

German Zeppelins again appeared in the rôle of raiders on the night of Aug. 5, 1918, when they made an attempt to raid the east coast of England. One machine was brought down 40 miles at sea, another was damaged, and the third was compelled to return. On the 12th, a Zeppelin was destroyed off the English coast. It fell in flames.

During the War the air raids on England caused the death of 1413 people and the injury of 3407. The vast majority of these were civilians. One hundred and ten raids were carried out by airships and aëroplanes. For a general discussion of aëroplanes and airships see AËRONAUTICS.

Political and diplomatic aspects of the War and its settlement will be found in the articles WAR, DIPLOMACY OF THE; PEACE CONFERENCE AND TREATIES; REPARATIONS; WASHINGTON CONFERENCE; LEAGUE OF NATIONS; RACIAL MINORITES TREATIES; LABOR ORGANIZATION, INTERNATIONAL; EUROPE. See also the sections *History* under the articles on the following countries: UNITED STATES; AUSTRIA-HUNGARY; GERMANY; FRANCE; GREAT BRITAIN; ITALY; JAPAN; CZECHO-SLOVAKIA; JUGO-SLAVIA; GREECE; BULGARIA; RUMANIA; TURKEY; RUSSIA.

WARD, CABOT (1876–). An American lawyer, born in New York City, and educated at Harvard and its law school. He practiced in New York City in 1905, when he was appointed auditor general of Porto Rico, and was Secretary of State for Porto Rico in 1908 and president of the Executive Council in 1909, when he was also appointed acting governor. He served as delegate to several Pan-American conferences and was a member of the United States Commission to Chile. From 1914 to 1917 he was president of the Park Board and Commissioner of Parks of New York City. In 1917 he was a member of the military commission studying anti-aircraft defense of cities in the war zone and on the French and British fronts. He served during the War as a major in the aviation section of the Signal Corps and was also assistant chief of staff and chief of the intelligence section on the line of communications with the American Expeditionary Forces. He was a member of many historical and other societies and contributed to magazines on Latin-American subjects.

WARD, HENRY BALDWIN (1865–). An American zoölogist, born at Troy, N. Y., and educated at Williams College and Harvard University and at Göttingen, Freiburg, and Leipzig. After teaching science in Troy (1885–88) he was instructor in zoölogy at the University of Michigan (1893); associate professor and professor of zoölogy (1892–1909) at the University of Nebraska and dean of the College of Medicine there (1902–09); and professor (1909–) at the University of Illinois. His research work was in connection with the Michigan Fish Commission, the biological survey of the Great Lakes, the Alaska salmon investigations, and studies on parasites of man and the lower animals. He published various papers on these subjects and *Fresh Water Biology*, with Whipple (1917). He also did editorial work for *The American Naturalist* and a *Reference Handbook of the Medical Sciences*. He founded the *Journal of Parasitology*.

WARD, JAMES (1843–1925). A British philosopher (see VOL. XXIII). His long-awaited *Psychological Principles* was published in 1918. It contains a systematic exposition of mental life from the point of view of the Act school. The mind is defined as a "continuum of presentations." In 1922 Professor Ward published his exhaustive *Study of Kant*.

WARD, SIR JOSEPH GEORGE (1857–). A New Zealand statesman, born at Melbourne, and educated privately. At 30 he was elected to Parliament and in 1891 became Postmaster General. He held this office continuously until 1912 and assumed it again in 1915; this second tenure lasted until 1919. In 1900 he was appointed Minister of Public Health; this is said to have been the first appointment of its kind in the world. Sir Joseph was premier of New Zealand from 1906 to 1912, and in 1915 he became Finance Minister. At the Imperial War Cabinet and War Conference meetings of 1917 and 1918 in London and also at the Peace Conference in Paris he represented New Zealand. He disappeared from public life when he shared the defeat of his party in the election of 1919

WARNE, FRANK JULIAN (1874–). An American economist, born in Parkersburg, W. Va., and educated at the University of Pennsylvania (Ph.D., 1902). From 1896 to 1902 he was connected with the Philadelphia *Public Ledger*, and during 1903–06 he was editor of *The Railway World*. In 1908 he became secretary of the New York State Immigration Commission and in 1910 was special expert with the United States Census; then, after holding various relations with different organizations, he became chief statistician of the Emergency Fleet Corporation in 1916. More recently he devoted attention to the publication of his studies on economic topics. In addition to many pamphlets and special articles he is the author of *The Slav Invasion and the Mine Workers* (1904); *The Coal Mine Workers* (1905); *The Immigrant Invasion* (1913); *Railway Operation and Finance* (1914); *Intercorporate Ownership and Interlocking Directorates of the Railroads of the United States* (1914); *The Tide of Immigration* (1916); *Warne's Book of Charts* (1917); *Industrial Relations* (1919); *The Workers at War* (1920); and *Train Employees' Reply to the Railroads* (1921).

WARNER, EDWARD PEARSON (1894–). An American aëronautical engineer, born in Pittsburgh, Pa., and educated at Harvard University and the Massachusetts Institute of Technology. He was engaged in aëronautical work continuously after 1916. He did much of the teaching in aëronautics at the special army and navy schools in aëronautical engineering. He was aëro engineer with the United States Army and did wind tunnel work and made miscellaneous researches in stability and stress analy-

sis (1917–18). In 1918–20 he was chief physicist with the National Advisory Committee for Aëronautics. He was in charge of aëronautical research at Langley Field and after 1919 was secretary of the committee on aërodynamics of the National Advisory Committee for Aëronautics. In 1920 he became associate professor of aëronautics at the Massachusetts Institute of Technology. He has written many books, reports, and technical notes, dealing chiefly with stability stress analysis and free-flight testing.

WARREN, CHARLES (1868–). An American lawyer, born at Boston, Mass., and educated at Harvard University and its law school. Admitted to the bar, he practiced in Boston, and after acting as private secretary to Gov. William E. Russell he was associated with him in law practice until the latter's death in 1896. From 1914 to 1918 he was Assistant Attorney General of the United States. He wrote *The Girl and the Governor, History of the Harvard Law School and Early Legal Conditions of America* (1909), and *The Supreme Court in United States History* (1922).

WARREN, CHARLES BEECHER (1870–). An American lawyer and diplomat, born at Bay City, Mich., and educated at the University of Michigan. He began the practice of law in Detroit in 1893. He was associate counsel for the United States before the Joint High Commission on the Behring Sea claims in 1896 and also represented the United States in the North Atlantic coast fisheries arbitration with Great Britain before The Hague tribunal in 1910. During the War he served on the staff of the Judge-Advocate-General. In 1921 he became United States ambassador to Japan, and the negotiations which he carried on with the Japanese government resulted, in March, 1923, in the cancelation of the Ishii-Lansing Agreement. He resigned from this post in December, 1923, and was appointed United States ambassador to Mexico in January, 1924.

WARREN, FRANCIS EMROY (1844–). An American legislator (see VOL. XXIII). He served continuously as United States Senator from Wyoming from 1890 and was reëlected in 1919 for the term expiring in 1925. He was chairman of the Committee on Appropriations in the 68th Congress and was also a member of the committees on education, labor, military affairs, and public buildings and grounds. He was the oldest Senator in point of service.

WARREN, WHITNEY (185?–). An American architect (see VOL. XXIII). Following the bombardment of Reims Cathedral by the Germans during the War, he made an examination of the damage done and prepared a report on restoration. He also prepared plans for and supervised the reconstruction of the University of Louvain in Belgium, destroyed by the Germans in 1914. During the entire period of the War he was engaged in relief work and was zealous in stimulating sympathy for France. He was a member of many architectural societies in the United States and foreign countries.

WAR RISK INSURANCE. See INSURANCE.

WARSHIP. See VESSEL, NAVAL; NAVIES OF THE WORLD.

WAR TAXES. See TAXATION IN THE UNITED STATES.

WASHBURN, ALBERT HENRY (1866–). An American diplomat, born at Middleborough, Mass., and educated at Cornell University and at the law school of the University of Virginia. At Cornell he acted as secretary to Andrew D. White. From 1890 to 1893 he was United States consul at Magdeburg, Germany. On his return to America he held various public offices and was prominent in the affairs of the Republican party. He was president of the Association of the Customs Bar (1917–22) and became professor of international law at Dartmouth in 1919. In 1922 he was appointed Envoy Extraordinary and Minister Plenipotentiary to Austria.

WASHBURN, EDWARD WIGHT (1881–). An American chemist, born in Beatrice, Neb., and educated at the Massachusetts Institute of Technology, where during 1906–08 he was a research associate in physical chemistry. In 1908 he became an associate at the University of Illinois, where during 1912–16 he was professor of physical chemistry and since 1916 professor of ceramic chemistry and head of the department of ceramic engineering. Dr. Washburn has made studies in physical chemistry on such subjects as ionic hydration and the theory of solutions, but more recently his researches have been concerned with high-temperature chemistry and the physics of ceramic materials. In addition to many papers on chemical, physical, and ceramic matters, he is the author of *Introduction to the Principles of Physical Chemistry* (1915; 2d ed., 1921).

WASHBURN, STANLEY (1878–). An American war correspondent and author, born at Minneapolis, Minn., and educated at Williams College and the Harvard University law school. He was reporter and correspondent with the Japanese army, for Chicago and Minneapolis papers, during the Russo-Japanese War; correspondent for *Collier's Weekly* in Russia (1914); correspondent of the *London Times;* and for 26 months the only American correspondent attached to the Russian army. He was also with the French at Verdun in 1916 and was in Rumania in the same year. His published writings include: *The Cable Game* (1911); *The Spirit of the Wilds* (1913); *Field Notes from the Russian Front* (1915); *Victory in Defeat* (1916); *The Russian Offensive* (1917); and a play, *The Man in Hiding.* In 1921 he was appointed to the secretariat of the American Delegation at the Conference for the Limitation of Armament.

WASHBURN COLLEGE. A coeducational institution founded at Topeka, Kan., in 1865. The student enrollment increased from 831 in 1915 to 1249 in 1923, including the summer session and the night school. The endowment rose from $260,000 to $950,893 and the value of the buildings from $274,708 to $543,664. Benton Hall, a dormitory for women, was built, at a cost of $170,000; the Mulvane Art Museum, at a cost of $60,000; and the Larrick Memorial Fountain. Holbrook Hall, formerly a dormitory for women, was completely remodeled and converted into a classroom building for the School of Law. There were 35,000 volumes in the library in 1923. President, Parley P. Womer, Sc.D.

WASHINGTON. The capital of the United States. The population increased from 331,069 in 1910 to 437,571 in 1920. Between 1914 and 1924 many public buildings and monu-



VIEW ACROSS THE LAGOON



STATUE IN MAIN HALL

THE LINCOLN MEMORIAL AT WASHINGTON, D. C.

ments were constructed. During the War concrete office buildings were built for the Navy and War Departments, a stone office building for the Department of the Interior, and 12 temporary hotels of gray stucco for women war workers, who found it extremely difficult to find quarters. These were still in use in 1924. The Lincoln Memorial, finished in 1921 at a cost of $2,584,000, was a finely proportioned building in the form of a Greek temple, containing a colossal seated figure of Lincoln, carved in marble by Daniel Chester French (q.v), and mural paintings representing emancipation and reunion. The Grant Memorial, the work of Henry Merwin Shrady, was dedicated in 1922, and George Washington Memorial Hall, containing a large auditorium and several smaller meeting-halls, was built in memory of heroes of the Revolution and the War in Europe. The National Academy of Sciences, on a gift of $5,000,000 from the Carnegie Corporation in 1919, erected a new building to contain its library and exhibition rooms. The Freer Museum was erected under the direction of the Smithsonian Institution through a gift from Charles L. Freer, to house the American and Oriental art collections of the capital. The National Shrine of the Immaculate Conception was begun by the Roman Catholic church, and work on the National Cathedral was continued by the Protestant Episcopal church. A new library was under construction in 1924, on funds of $200,000 contributed by the Carnegie Corporation. Following the passage of a law in 1920, the entire District of Columbia was zoned. A gas tax law was enacted in 1924. In 1919 race rioting in Washington resulted in death to seven and injury to scores of others.

WASHINGTON. Washington is the nineteenth State in size (69,127 square miles), and the thirtieth in population; capital, Olympia. The population increased from 1,141,990 in 1910 to 1,356,621, in 1920, a gain of 18.8 per cent. The white population increased from 1,109,111 to 1.319,777. The number of Indians fell from 10,997 to 9061, and the number of Chinese from 2709 to 2363. The Japanese increased from 12,929 to 17,387, and the negroes from 6058 to 6883. The native white population rose from 867,914 to 1,069,722; the foreign-born white from 241,197 to 250,055. Both urban and rural populations mounted, the former from 605,530 to 748,735, the latter from 536,460 to 607,886. The growth of the principal cities was as follows: Seattle, 1910, 237,194; 1920, 315,312; Spokane, 104,402, 104,437; Tacoma, 83,743, 96,965. See articles on these cities.

Agriculture. As in most of the western States, agriculture in all its phases showed a considerable increase in Washington from 1910 to 1920. The increase in number of farms (18 per cent) kept pace almost exactly with the increase in population (18.8 per cent). The acreage of land in farms increased from 11,712,235 in 1910 to 13,244,720 in 1920, or 13 1 per cent; the number of farms increased from 56,192 to 66,288; and improved land in farms increased from 6,373.311 to 7,129,343 acres. The percentage of total land area used for agricultural purposes in 1910 was 27.4, and in 1921, 31. The percentage of farm land improved decreased from 54.4 to 53.8. The total value of farm property showed an apparent increase, from $637,543,411 to $1,057,429,848, or 65.9 per cent; the average value per farm, $11,346 to $15,952, or 40.6 per cent. In interpreting these values and indeed all comparative values for the decade 1914–24, the inflation of the currency in the latter part of the period is to be taken into consideration The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 66,288 farms in 1920, 52,071 were operated by owners, 1168 by managers, and 12,419 by tenants The corresponding figures for 1910 were 47,505, 961, and 7726. White farmers in 1920 numbered 65,022, of whom 45,265 were native and 19,757 foreign-born. There were 1266 colored farmers; 460 Indians and 699 Japanese White farmers in 1910 numbered 55,067 (37,770 native, and 17,297 foreign-born), and in that year there were 673 Indian and 316 Japanese farmers. Farms free from mortgage in 1920 numbered 25,012, compared with 30,979 in 1910. Those under mortgage numbered 24,004, compared with 16,026. The area under irrigation increased from 334,378 acres in 1909 to 529,899 in 1919. The number of dairy cows increased from 186,233 in 1910 to 289,635 in 1920; "beef cows" from 58,140 to 88,969; sheep, from 295,264 to 623,779. The estimated production of the principal farm crops in 1923 was as follows: corn, 2,959,000 bushels; spring wheat, 21,147,000; winter wheat, 37,015,000; oats, 11,110,000; barley, 3,295,000; potatoes, 8,467,000; hay, 2,465.000 tons; and apples, 30,668,000 bushels. Comparative figures for 1913 are: corn, 952,000 bushels; wheat, 53,300,000; oats, 14,250,000; barley, 7,290,000; potatoes, 7,380,000; and hay, 1,794,000 tons.

Mining. The mineral resources of Washington were as yet largely undeveloped. The chief mineral is coal, although cement, clay products, and sand and gravel also are produced in valuable quantities. The coal output during the decade 1914–24 was as follows: 1914, 3,064,820 net tons; 1915, 2,429,095; 1916, 3,038,588; 1917, 4,009,902; 1918, 4,082,212; 1920, 3,757,093; 1921, 2,428,722; and 1922, 2,581,165. The value of the cement produced annually was between $2,000,000 and $4,000,000 during this period. The State produced also a small amount of copper, gold, and iron ore. The total value of the mineral production in 1921 was $17,605,878, compared with $26,677,191 in 1920; $18,267,938 in 1919; $20,999,691 in 1918; and $13,830,739 in 1914.

Manufactures. Washington developed greatly in industrial importance after 1909. In 1920 there were in the State 10 cities having more than 10,000 inhabitants. These formed 63 8 per cent of the total population, and in 1919 reported 63.8 per cent of the total value of the State's manufactured products There were in the State, in 1909, 3674 manufacturing establishments; in 1914, 3829; and in 1919, 4918. Persons engaged in manufacture numbered 80,118, 78,448, and 150,479; and the capital invested amounted to $222,261,229, $277,715,262, and $574,235,183, in those years. The value of the manufactured product amounted to $220,746,421 in 1909; $245,326,456 in 1914; and $809,622,984 in 1919 The increase in value of products between 1914 and 1919 was due in great measure to changes in industrial conditions brought about by the War and cannot be properly used as an index of the industrial expansion during the census period; but the in-

crease in number of persons employed clearly indicates decided growth in the manufacturing activities of the State. The lumber and timber industry is chief in point of value of product, with an output valued at $89,155,000 in 1909; $83,536,000 in 1914; and $234,881,000 in 1919. Shipbuilding and boatbuilding ranks second in this respect, amounting in 1909 to $1,550,000; in 1914, to $3,101,000; and in 1919, to $166,520,000; the phenomenal increase in the value of this product from 1914 to 1919 was due to the building of many vessels for war purposes. The chief manufacturing cities are Seattle and Tacoma. There were in Seattle, in 1909, 753 establishments, with a product valued at $50,814,000; in 1914, 1014 with $64,475,000; and in 1919, 1229 with $274,431,000. In 1909, Tacoma had 277 establishments, with a product valued at $24,462,000; 1914, 339 with $27,708,000; and 1919, 348 with $103,172,000.

Education. Educational progress in Washington was steady and consistent in the decade 1914–24. The Legislature passed important measures, especially in the latter part of the period, which did much to improve the administration and efficiency of the schools. Progress was especially notable in connection with the rural school work. The following objects had been accomplished: the establishment of a State-wide retirement fund; a constructive programme in State-wide consolidation; increased aid for high schools; establishment of the observation of a State-wide temperance and good citizenship day; increased direct supervision of rural schools through the eighth grade; exemption law, and higher professional standards for teachers. Strong efforts were being made for the establishment of the community unit system; i.e. the grouping of related school districts in neighboring units sufficiently large to support community high schools; and while the bill failed to pass the Legislature, keen interest was aroused in this constructive solution for rural education in State school administration. Vocational education had been carried on since 1919, and the Legislature passed an act providing for its further development in accordance with the Smith-Hughes Act. There was a constant increase from year to year in the number of courses offered and in the number of students. The enrollment in public schools increased from 239,663 in 1914 to 301,800 in 1922. The enrollment in high schools in 1921–22 was 29,069. Total expenditure for educational purposes in 1922 was $29,983,084. The percentage of illiteracy in the State decreased from 3 2 in 1910 to 2.1 in 1920. In the native white population it remained at 0.3 per cent; in the foreign-born white, it increased from 4.7 to 5 per cent; in the negro, it decreased from 4.8 to 4.6.

Finance. For finance, see STATE FINANCES.

Political and Other Events. There were more political overturns in Washington in 1914–24 than in any previous decade. The State, for the most part, remained in Republican control. Elections were held in 1914 for United States Senator and for Representatives in Congress. Senator Jones was reëlected. In the city of Seattle, Hiram C. Gill, who was once recalled as mayor, was again chosen mayor on a Nonpartisan ticket. A measure providing for State-wide prohibition was carried in November. In 1916 a Democratic governor, Ernest Lister, was reëlected and the electoral vote went to Wilson by a narrow margin. On the other hand, Senator Poindexter, Republican, was elected to the Senate by the largest majority ever given a candidate for that office in the State, and the entire Republican State ticket except the governor was elected. A strike in the shipyards, involving 25,000 workmen, broke out in Seattle in February, 1919 It was said to be instigated largely by the I. W. W. Mayor Ole Hanson took action by increasing the police force and by calling for troops from Camp Lewis. These measures had a determinative effect on the strike. There were no State elections in 1918. In 1920 the Republicans elected their candidate for governor, Louis F. Hart, and Wesley L. Jones was reëlected to the Senate. In the presidential voting in this year, W. G. Harding received 223,137 votes; J. M. Cox, 84,298. In 1922 a campaign on Poindexter's record in the Senate resulted in the election of C. C. Dill, Democrat, to the Senate. On Nov. 12, 1923, the United States Supreme Court sustained the State laws prohibiting the ownership of agricultural lands by Japanese and other aliens ineligible to citizenship.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. The Legislature passed a minimum wage act which went into effect on Feb 20, 1915 On Jan. 13, 1917, the Legislature adopted the "bone dry" prohibition amendment. It also passed measures substituting life imprisonment for the death penalty, unless the jury in addition to the verdict of guilty found that the death penalty should be inflicted. The Legislature created a State Safety Board with legal aid boards to investigate industrial accidents. It also enacted measures defining and punishing criminal syndicalism and sabotage. In 1921 a measure was passed extending the power to vote for county and precinct, as well as for Federal and State officers, to absent voters. In 1923, the sale of narcotics was made a felony, and the possession of drugs illegally obtained was made a crime.

WASHINGTON, STATE COLLEGE OF. A coeducational State institution founded at Pullman, Wash., in 1890, under the National Land Grant Act. The student enrollment increased from 1184 in 1914 to 2256 in 1923–24 and the total yearly income from $458,000 to $1,082,195. The members of the faculty numbered 264 in 1923–24, and the library contained 90,000 bound volumes and 100,000 pamphlets. David S. Troy Hall for the dairy department, three dormitories for women, one for men, and several farm buildings were constructed during the period. President, Ernest O. Holland, Ph.D.

WASHINGTON, UNIVERSITY OF. A coeducational State institution at Seattle, Wash., founded in 1861. The university increased considerably in size between 1914 and 1924. In 1914 the student enrollment stood at 2888; the faculty numbered 194; the library contained 64,000 volumes. In 1923, the total enrollment reached 7005, and the enrollment for the first term of 1923–24 was 5221; the faculty was increased to 275 members; the library contained 126,784 volumes. The three Schools of Business Administration, Library Economy, and Fisheries were opened during the decade. Education Hall, Home Economics Hall, Commerce Hall, Philosophy Hall, the forest products laboratory, the mines laboratory, and a stadium

seating 30,000 were built. Construction was begun on a new library building. The university received a gift of the Boeing Aërodynamical Laboratory in 1919 and a gift of $250,000 for a new building for the College of Forestry in 1923. The four quarter plan was adopted in 1917, and various war courses were offered. The requirements for entrance and the scholarship standards were materially raised in 1921. President, Henry Suzzallo, Ph.D.

WASHINGTON AND JEFFERSON COLLEGE. A nonsectarian institution at Washington, Pa., founded in 1802. The student enrollment in 1915 was 326 as compared with 464 in the year 1923–24, and 276 in the summer school of 1923. The faculty numbered 21 members in 1915 and 31 in 1923, and the library was increased from 26,000 to 36,000 volumes. The endowment of the university was about $1,000,000 in 1923–24. The presidents during the decade were Frederick W. Hinett, Ph.D., D.D., 1914–18; W. E. Slemmons, D.D., acting president, 1918–20; Samuel Charles Black, D.D., LL.D., 1920–21; S. S. Baker, M.S., LL.D., 1921–

WASHINGTON AND LEE UNIVERSITY. A nonsectarian institution for men at Lexington, Va., founded in 1749, maintaining departments of liberal arts, commerce, engineering, and law. The student enrollment increased from 492 in 1914 to 801 in 1923–24 and after 1920 was strictly limited in number. During the same period the size of the faculty was increased from 26 to 57; the salaries were increased about 40 per cent; and a complete system of contributory retiring allowances was established. The permanent endowment of the university was increased 50 per cent between 1914 and 1923–24; the number of volumes in the library rose from 50,000 to 55,000; and the income was more than doubled. A new dormitory, with accommodations for 116, was built in 1920, and a chemical laboratory, to cost about $150,000, was under construction at the close of 1923. Two years of college work were made requisite for entrance to the Law School, and departments of education, electrical engineering, and public speaking were opened. A campaign was carried on in the South during 1923–24 to raise $500,000 to reëstablish the original School of Journalism of the university, which was founded in 1869 while Gen. Robert E. Lee was president The United Daughters of the Confederacy were raising $150,000 for building a Lee Memorial Chapel. President, Henry Louis Smith.

WASHINGTON CONFERENCE. The possibility of the nations' disarming has been a favorite theme of prophets and poets. The Hebrew prophets told of a time when nations would "beat their swords into ploughshares and their spears into pruning-hooks." Tennyson sang of the day when "the war drum throbs no longer and the battle flags are furled." But after the Paris Conference the reduction of expenditures for armaments was the concern of statesmen, and some real progress was made The great naval powers actually put a limit on capital ships, and European states even discussed a treaty to limit land armaments.

Previous Attempts. In the past numerous proposals were made to limit armaments, but the actual results were extremely meagre. In 1764 Prince Kaunitz, Prime Minister of Austria, suggested to Prussia that each state dismiss three-fourths of its army, but Prussia declined. Five years later the suggestion was renewed by Joseph II, but Frederick the Great again declined. In 1841 Sir Robert Peel made a disarmament proposal in the House of Commons, and in 1862 Disraeli suggested the possibility of an agreement with France. Winston Churchill proposed a naval holiday (1913). Napoleon "the Little" also dreamed of curtailing his military expenditures. In 1853 he expressed his intention of calling a European conference to reduce armaments. He discussed the matter with Czar Alexander II and William II of Prussia and received some encouragement, but in 1870 an informal proposal to Prussia through the English Secretary of State for Foreign Affairs, Lord Clarendon, was rejected by Bismarck. The Chancellor was responsible for the rejection of several other attempts to secure a discussion of armament. Resolutions were introduced into the Reichstag, but the influence of the government was always sufficient to prevent them from coming to a vote. Bismarck refused, furthermore, to consider the matter with Crispi, then President of the Italian Chamber.

In the United States the problem of armament agreements was several times on the tapis of Congressional and executive policy. Elihu Root, as a member of the American delegation to the Second Hague Peace Conference, held that he and his colleagues should support any European power which desired to secure consideration of armaments. In 1910 the American Congress authorized the appointment of a commission to inquire into the possibility of securing a limitation of armaments and of constituting the combined navies of the world into an international police force. The commission was never appointed, and no action was taken under a similar authorization in the Naval Appropriation Bill of 1916. Until the Washington Conference only two attempts to check war expenditures had not proved abortive; in 1817 the United States and Great Britain entered into the Rush-Bagot agreement for the limitation of armaments on the Great Lakes, and in 1902–03 Argentina and Chile negotiated a treaty relating to naval armaments. "The Christ of the Andes" was erected to commemorate the signing of this treaty. During the War both the Allies and the Central Powers professed their willingness to discuss armaments. Wilson's Fourth Point stipulated that "adequate guarantees [be] given and taken that national armaments will be reduced to the lowest point consistent with domestic safety." The Treaty of Versailles provided for a thoroughgoing disarmament of Germany, and the Covenant of the League of Nations declared that the members recognized "that the maintenance of peace requires the reduction of national armaments to the lowest point consistent with national safety." The Council was instructed to "formulate plans for such reduction for the consideration and action of the several governments." The members agreed, furthermore, that "the manufacture by private enterprise of munitions and implements of war is open to grave objections. The Council shall advise how the evil effects attendant upon such manufacture can be prevented, due regard being had to the necessities of those members of the League which are not able to manufacture the munitions and implements of war necessary for their safety." At

Saint-Germain-en-Laye, on Sept. 10, 1919, 23 powers signed a convention for the control of the trade in arms and ammunition, but before this could go into effect and before any action could be urged by the League of Nations, a conference called by the United States at Washington had agreed to a limit on capital ships.

The Conference at Washington. Senator William E. Borah of Idaho was more than any other individual responsible for the calling of the Washington Conference, and his activities were at first viewed with some suspicion by President Harding and Secretary Hughes. On Dec. 14, 1920, Senator Borah introduced in the Senate a resolution which became part of the Naval Appropriation Bill of 1921. The President was authorized and requested "to invite the Governments of Great Britain and Japan to send representatives to a conference, which shall be charged with the duty of promptly entering into an understanding or agreement by which the naval expenditures and building programmes of each of said governments . . . shall be substantially reduced annually during the next five years to such an extent and upon such terms as may be agreed upon." Executive opposition could not keep this provision out of the Naval Bill, but how far the agitation in Congress and the country forced the executive to reluctant action and how far it was simply pressure on a door which had begun to swing open, it is difficult to say. On July 10, 1921, the State Department issued a proclamation announcing that a conference was to be called. Great Britain, Japan, and the United States were the principal naval powers, but before they could agree on limitation, there had to be a full discussion and agreement on the political situation in the Pacific. Policy and armament go hand in hand. Preparedness is only half-preparedness if not measured according to the demands of a nation's foreign policy. President Harding appointed as the American representatives Secretary Hughes, Elihu Root, Senator Lodge, leader of the Republican majority in the Senate, and Senator Underwood, leader of the Democratic minority. Apparently President Harding, unlike Wilson in the case of the Treaty of Versailles, was ready to placate the Senate in advance. The Conference began on Nov. 12, 1921, and lasted until February, 1922. Seven treaties were adopted:

(1) A treaty between the United States, the British Empire, France, Italy, and Japan with respect to the limitation of naval armament
(2) A treaty between the same powers in relation to the use of submarines and noxious gases in warfare.
(3) A treaty between the United States, the British Empire, France, and Japan relating to their insular possessions and dominions in the Pacific Ocean.
(4) A declaration accompanying this treaty.
(5) A treaty between the same four powers supplementary to the above.
(6) A treaty between the United States, Belgium, the British Empire, China, France, Italy, Japan, the Netherlands, and Portugal relating to policies in matters concerning China.
(7) A treaty between the same nine powers relating to the Chinese customs tariff.

In addition, 12 resolutions were adopted relating to such matters as proposals for the amendment of the laws of war; extraterritoriality in China; reduction of Chinese military forces; the Chinese Eastern Railway; and radio stations and foreign postal agencies in China. The most spectacular result of the Conference was the Five-power Naval Treaty which established a 5-5-3 ratio for the capital ships of the United States, Great Britain, and Japan, and maintained the status quo in respect to American and Japanese fortifications in the Pacific. This treaty was in large part due to the important speech which Secretary Hughes made at the opening of the Conference. He not only urged disarmament with an eloquence which recalled President Wilson's utterances, but he had a definite scheme which the United States approved and which, at the same time, was not unfair to Great Britain and Japan. He suggested the following four principles:

1. All capital shipbuilding programmes, either actual or projected, should be abandoned.
2. Further reduction should be made through the scrapping of the older ships.
3. In general, regard should be had to the existing naval strength of the powers concerned.
4. The capital ship tonnage should be used as the measurement of strength for navies, and a proportionate allowance of auxiliary combatant craft should be prescribed.

This scheme entailed the scrapping of 1,878,073 tons, or 60 capital ships—30 for the United States, 23 for Great Britain, and 17 for Japan. Some modifications of detail were made, largely because of Japanese reluctance to agree to the ratio. Japan was finally permitted to retain the *Mutsu*, one of the most powerful ships afloat; but it was a Pyrrhic victory, for in compensation Great Britain was allowed to build two superdreadnoughts, and the United States got the right to complete two battleships of the *West Virginia* class. This bargain, however, was rather costly in money to Great Britain and the United States.

Some naval strategists maintained that the capital ship was obsolete; if that were so, its limitation was little more than a magnificent gesture. The limitation of capital ships, furthermore, it was contended, would really cause an increased construction of smaller vessels, and these the Conference failed to limit. Indeed, the naval programmes of the powers, following 1922, already began to compete in ships which the treaty did not cover. Archibald Hurd, one of the most distinguished naval experts of England, declared that one of the results of the Conference would be to "set up a higher standard for submarines, placing on each nation what amounts practically to an obligation to continue building submarines." Here, probably, was the most conspicuous failure of the Conference. The submarine, "the criminal of the seas," which was directly responsible for the entrance of the United States into the War, was turned loose with a certificate of good conduct. Article I of the treaty on the subject authorized the use of the submarine under certain specified conditions as a commerce destroyer. Article IV, however, declared that the signatory powers recognized the practical impossibility of using the submarine as a commerce destroyer. There were ambiguities in the treaty which seemed likely to cause difficulty in the event of war, and meanwhile there was no limitation. Great Britain was anxious to act drastically, but France, on account of her strategic position, wished to retain the submarine as a weapon. France was excluded from the meetings in which England, the United States, and Japan deliberated on the naval holiday; and she was not notified of the decisions until they were accomplished facts. The American delegation might have been more diplomatic in this respect, since France's coöperation was necessary

if submarines were to be successfully dealt with, to say nothing of the interests of the United States in having France agree to the rehabilitation of Germany. Aircraft, also, was too big a problem for the Conference, although in this case their commercial possibilities would make any form of limitation extremely difficult. Another lacuna of the conference was its failure to define a merchant ship in the treaties relating to this subject.

Of the other treaties one deserves special mention. The United States, Great Britain, France, and Japan agreed "as between themselves to respect their rights in relation to their insular possessions and insular dominions in the region of the Pacific Ocean." Article II provided that "if the said rights are threatened by the aggressive action of any other power, the high contracting parties shall communicate with one another fully and frankly in order to arrive at an understanding as to the most efficient measures to be taken, jointly or separately, to meet the exigencies of the particular situation." This was the so-called Four-power Treaty. It gave rise to a lively controversy in the United States Senate. In particular, critics did not fail to point out the similarity of this language to that of Article X of the League of Nations Covenant. One serious question raised by the treaty was whether the phrase "insular dominions" included the Japanese mainland. If it did—and this was the interpretation first given the treaty—the United States would be bound to confer on the measures necessary to protect Japan. The United States might be forced into indirect support of possible Japanese imperialism. There was a difference of opinion between President Harding and Secretary Hughes as to whether Japan proper was included, and as a result of the ensuing public discussion, a supplementary treaty was drawn up, excluding the mainland from the term "insular possessions and insular dominions." The treaty probably left Japan in a better position in the Pacific than she was in before, for American diplomatic freedom of action was limited. The most beneficial result was that the Anglo-Japanese Alliance (q.v.) was canceled. This was one of the principal objectives of the American delegation to the Conference. But if, from the point of view of the United States, the Four-power Treaty was considered a winding-sheet for the Anglo-Japanese Alliance, Japan apparently thought that the Alliance was extended. Premier Takahashi declared that the "Quadruple Entente, which for Japan replaces the Anglo-Japanese Alliance, is much wider in its bearing and removes all chances of war." But some pledge like the Four-power Treaty was necessary to provide the moral disarmament which must be secured before actual disarmament could be achieved. The Four-power Treaty was bound up with the naval pact.

At the Conference, China met with both successes and reverses. One achievement of the Conference, the Shantung (q.v.) agreement, was a real advance. Direct negotiations had failed. China had little hope of securing assistance from the League of Nations, but in the Washington Conference she was able to debate the matter with Japan and to receive satisfaction. Two important treaties relating to foreign rights and interests in China and the Chinese tariff failed to give China what she wanted. The United States stood back of China on occasion, but the matters involved were quite technical. The country was much more interested in the naval aspects of the conference, and there was no strong public opinion in the United States in favor of going to her aid and letting China get out of the straitjacket in which imperialistic policies had succeeded in placing her. See CHINA; SHANTUNG; YAP ISLAND; NAVIES OF THE WORLD.

Land Armaments. One other matter requires mention. The Washington Conference failed to consider land armaments. This problem, to be sure, had been on the agenda of the Conference, but it was soon seen that it was too closely bound up with the situation in Europe for it to be dealt with by naval powers meeting in Washington. One of the results of the Paris Conference, however, was the Treaty of St. Germain to deal with the traffic in arms and munitions. Its purposes were two. In the first place, it was intended to prevent shipments of arms, except for strictly governmental purposes, to so-called "backward areas," e.g. the African colonies, Persia, Arabia, etc. The second purpose was to require government licenses for all shipments of arms and to insure publicity for licenses that were granted. States ratifying the convention promised to allow no exports except under a license indicating the character and destination of the shipment and to prohibit shipments if the state of destination were not a party to the convention. In other words, shipments to revolutionaries or to countries not signatory to the convention would be forbidden. Annual reports on the licenses were to be made to an office under the control of the League of Nations. The first two Assemblies of the League urged ratification of this convention, and the desire was expressed that the matter be taken up at the Washington Conference; but nothing was done.

By September, 1923, the convention had been ratified by a number of unimportant states. France, Great Britain, Spain, Italy, and Japan had signified their willingness to ratify on condition that all the principal munitions-making powers would come in. The United States remained indifferent to the convention, but finally Secretary Hughes did consent to state some of the objections of the United States. The principal one was that the contracting parties were prohibited from selling munitions to states not parties to the convention. The agreement of the United States, one of the principal manufacturing nations, was essential if the matter was to be dealt with, and it was a hopeful sign when early in 1924 a League of Nations committee began consideration of the St. Germain convention to see if it could not be made satisfactory to the United States. Joseph C. Grew, American Minister to Switzerland, was present as an "observer" for the State Department.

The first Assembly of the League of Nations set up a so-called Temporary Mixed Commission on Armaments. To make possible the reduction of land armaments in Europe, the commission proposed a Draft Treaty of Mutual Assistance, the work of Viscount Cecil. The treaty was based on the theory that "a certain number of states are not in a position to contemplate a reduction of their armaments without receiving in exchange a guarantee of their security." The treaty provided a general guarantee, supplemented in the case of certain countries by special treaties. The scheme was approved by

the third Assembly of the League (1923) and was sent to the constituent governments for consideration. No doubt there would be objections to the proposal as a plan encouraging alliances, but at least it showed that the League was seriously at work on the problem of military expenditures in Europe.

WASHINGTON UNIVERSITY. A nonsectarian, coeducational institution at St. Louis, Mo., founded in 1853. The student enrollment increased from 1390 in 1914 to 4849 in 1923–24, the faculty from 208 to 395 members, the library from 142,589 bound volumes and 60,000 pamphlets to 225,000 bound volumes and 83,000 pamphlets, and the productive funds from $6,156,223 to $14,481,364. The Wilson swimming pool and funds for Wilson Memorial Hall for the department of geology, the latter in memory of her husband, were given by Mrs. Newton R. Wilson; and the Grace Valle January law school building and funds for the erection of a building for the School of Fine Arts were received by the university from other sources in 1922. By donation of private persons and the General Education Board the projected School of Medicine was endowed with $1,600,000, and $100,000 was given by Robert S. Brookings in 1923 for a residence foundation in Washington, D. C., in connection with the newly established Graduate School of Economics and Government. A chair of history was endowed through an anonymous gift of $100,000 in 1922. Frederic A. Hall was acting chancellor, succeeding David F. Houston on his resignation in 1917, and was succeeded in turn by Herbert S. Hadley, in 1923.

WASSERMANN, JACOB (1873–). A German novelist, born at Furth. He has lived much in Austria. He is the author of many works, including: *Die Juden von Zirndorf* (1897); *Geschichte der Jungen Renate Fuchs* (1901); *Der Niegeküsste Mund* (1902); *Der Moloch* (1903); *Alexander in Babylon* (1905); *Die Schwestern* (1906); *Caspar Hauser, oder die Trugheit des Herzens* (1908); *Die Masken Erwin Reiners* (1910); *Der Goldene Spiegel* (1911); *Der Mann von Vierzig Jahren* (1913); *Das Gansemännchen* (1915); *Christian Wahnschaffe* (1917); *Der Wendekreis* (1920); and several prose essays, *Die Kunst der Erzahlung; Faustina, oder ein Gesprach uber die Liebe* (1912), and *Mein Weg als Deutscher und Jude* (1920). In 1924, *Gold* was published in America.

"WATCHFUL WAITING." See MEXICO, *History*.

WATER METERS. See WATER WORKS AND WATER PURIFICATION.

WATER POWER. In the period from 1914 to 1924 there was no more important movement for the development of natural resources than that concerned with making water power available for the use of industry in an economical, convenient, and efficient manner. This was particularly evident with the increased cost of fuel, involved especially in the raising and transportation of coal, and due to the growing demands of industry along with the improved standards of living. This condition held good the world over, and the development of water power in such countries as Switzerland, Italy, and Scandinavia, not to mention North America, was indeed most important. Obviously it was a subject which required deep interest and supervision even when private capital was employed, and for the construction of dams, power plants, and transmission lines considerable outlay was involved, although the maintenance costs were comparatively low. Naturally in the years immediately succeeding the War it was not always easy to secure such capital in view of government indebtedness, high rates for loans, and often lack of private capital. Nevertheless, in many parts of the world there were important developments, as, for example, in connection with railway electrification in France and in Switzerland, for industrial purposes in Italy, and for general power development in America. In most instances there was involved the construction of dams to provide suitable reservoir and adequate heads of water for the use of natural waterfalls, as at Niagara and other places. See DAMS.

Although North America contains less than 15 per cent of the water-power resources of the globe, nevertheless by 1924 it had developed more water power than all the rest of the world. About 41 per cent of the world's developed water power was in the United States, and even at that it was estimated that only about 8 per cent of the water-power resources of the United States had been developed. European countries, particularly Germany, the territory comprised in the former Austria-Hungary, Norway, Sweden, France, Italy, and Switzerland, had developed a relatively larger percentage of their water power but had not in any way approached the possible. Many of these countries had little or no natural fuel, and consequently with their ever-increasing industrial demands for power they were forced to develop their water-power resources. These developments were somewhat restricted by economic and financial conditions following the War, but by 1924 they had progressed steadily, and there was every indication that much more would be done in that direction. While Asia, Africa, South America, and Central America all possess water power in varying degrees, much of the territory of these countries has been comparatively unexplored, and in their present economic condition the development of water power is a subject of little interest.

It might be said that Northern and Southern Africa, where the rainfall is low, have but limited water-power resources, while tropical Africa, particularly the Congo Basin, with a heavy rainfall, has vast possibilities for the production of water power. Asia with its vast area and the high altitude of its central part is inferior in water-power resources to Africa, on account of the low precipitation through Northern, Western, and Central Asia. This subject is comprehensively summarized in "Water Power of the World," Part II of the *World Atlas of Commercial Geography*, published by the United States Geological Survey (Washington, 1921).

Water Power in the United States. For many years there had been considerable discussion and controversy as to the Federal water powers on streams within its jurisdiction. The matter, however, had not attained important dimensions until the twentieth century, and even then laws passed in 1901 and 1910 on the administration of water power hardly took into consideration the part which electrical power was destined to play in transportation and industry, or the safeguards which the State in the disposition of its important natural resources

would be required to make in the interest of the investor as well as of the public. In fact, the rights granted at first were so insecure and the liabilities imposed were so uncertain that it was difficult to finance water-power developments requiring Federal authority, and the result was that American industry was unable to utilize the large water-power resources available to it. The Congress of the United States in 1924 had control over the disposition of some 85 per cent of the potential water powers of the nation. This authority depends on three fundamental bases: first, that the United States is owner of the public lands, which may be used only in such manner and for such purposes as Congress may direct; secondly, that jurisdiction over all navigable waters of the United States is given to Congress through its power to regulate commerce, and it also has authority to determine what structures may be erected in or over them and under what conditions, thirdly, the manner in which international waters can be diverted and used, which of course must be the subject of treaty between the nations concerned, and the only power of making and enforcing treaties in the United States belongs to the Federal government.

In the beginning, Congress left the regulation of navigable rivers, and in a large measure their improvement, to the several States and acquiesced in the construction on such streams of whatever structures the State laws might authorize. The use of public lands for power purposes also fell under a condition of similar policy, but later this policy was modified through legislation seeking to preserve the public interest in the power resources under public control. Such legislation, however, did not appreciate the conditions which were necessary if these resources were to be developed for public use. Under the Act of 1901 grants on public lands and reservations were made by the Executive Department, on navigable streams, power grants demanded a special act of Congress. The Act of June 23, 1910, superseding a similar act approved on June 21, 1906, merely fixed the general conditions under which the special grants were made. These acts were considered practical failures, and in order to meet the conditions which had arisen and to provide for the proper requirements of industry as well as to protect the nation at large, the Federal Water-power Act was passed by Congress and approved June 10, 1920. This Act created the Federal Power Commission, made up of the Secretary of War, the Secretary of the Interior, and the Secretary of Agriculture, together with an engineering, technical, legal, and administrative staff which was authorized to make investigations and to collect and report data concerning water resources and the water-power industry.

The Commission was also empowered to issue permits and licenses for the construction, operation, and maintenance of dams, water conduits, reservoirs, power plants, transmission lines, and like projects, such licenses being issued for a period not exceeding 50 years, and prescribing special conditions under which the licensee should operate, including, of course, those that were set forth in some detail in the Federal Water-power Act itself. After the passage of this Act three important projects affecting navigable waters where power development had already taken place were adjusted to the Water-power Act. These were the Coosa River project in Alabama, the Connecticut River project, and the Niagara Falls project, all of which were adjusted to the new statutes, and licenses were issued bringing the various operating companies into line with the new order of control. These of course were not the only projects that were brought before the attention of the Federal Power Commission, as many applications were made for licenses in cases where there was no question of policy or controversy involved, as well as for projects which involved political or other complications. At the close of the fiscal year ending June 30, 1923, the Federal Power Commission reported that it had received applications involving an estimated installation of 21,500,000 horse power and had issued permits and licenses for an aggregate installation of 7,500,000 horse power, and that there were built or were building 2,400,000 horse power under license of the Commission. Previous to the passage of the Power Act only 1,400,000 horse power had been made available under Federal authority, while at the time of the passage of the Water-power Act the aggregate installation in all water-power plants in the United States amounted to only 9,000,000 horse power.

From this summary it will be apparent that the legislation of 1920 not only was needed but was the forerunner of improved and substantial developments. This does not mean that the Federal Power Commission was not involved in controversy or that there was a uniform acceptance by the various States of attempts to exert Federal authority over streams more or less navigable. This gave rise to legislation and to litigation which up to the autumn of 1924 was far from settled. For example, the water-power developments proposed for the Colorado, Columbia, and St. Lawrence Rivers and at Muscle Shoals, representing some 13,000,000 horse power, were far from settled in the summer of 1924. The State of Arizona refused to ratify the treaty negotiated among seven States for the development of the Colorado, while the method of utilizing the Wilson Dam and Power House, constructed by the Federal government, was long a subject of controversy. (See DAMS and MUSCLE SHOALS.) Likewise over the Columbia River project a controversy arose between the reclamation and power interests, and until these and other matters could be settled it was not possible to proceed with such projects as the Priest rapid development which would involve 750,000 horse power developed by a dam two and a half miles in length, situated about halfway between Spokane and Portland. In 1924 the development of power along the St. Lawrence River was awaiting international agreement before either United States or Canadian interests could proceed with it. In 1923 the Federal Power Commission issued a permit involving 360,000 horse power on the Susquehanna River, and also a permit to the West Virginia Power and Transmission Company on the Chesapeake River, where an installed capacity of 600,000 horse power was considered possible.

In 1923 in the electric public-utility power plants in the United States, about 19,333,000,000 kilowatt hours of electricity was produced by the use of water power. To produce this quantity of power by the use of fuel would have required 23,250,000 tons of coal, representing a

cost considerably over $100,000,000. The electricity produced by the use of water power for public-utility power plants in 1923 was 34.8 per cent of the total, a decline from the 37.5 per cent of 1919; but it was believed that in a year of more than normal water supplies throughout the United States, the quantity of electricity so produced would increase materially. California ranked first in the use of water power for the production of electricity, 21 to 22 per cent of the total production for the entire United States being generated within its limits. In this respect it exceeded New York, which ranked first in 1920 and produced in

DEVELOPED WATER POWER IN THE UNITED STATES, IN 1924
(Capacity of water wheels installed in plants of 100 horse power or more)

Division and State	Total		Public utility and municipal		Manufacturing and miscellaneous	
	Number of plants	Capacity in horse power	Number of plants	Capacity in horse power	Number of plants	Capacity in horse power
United States	3,211	9,086,958	1,390	7,348,197	1,821	1,738 761
New England	1,228	1,387,364	249	644,831	979	742 533
Middle Atlantic	607	1,731,881	228	1,408,173	379	323,703
East North Central	342	829,854	212	625,826	130	204,028
West North Central	183	459,736	117	376,864	66	82,872
South Atlantic	259	1,295,978	129	1,045,728	130	250,250
East South Central	50	345,584	32	323,816	18	21,768
West South Central	27	16,727	12	12,515	15	4,212
Mountain	226	880,783	178	860,937	48	19,846
Pacific	289	2,139,051	233	2,049,507	56	89,545
New England						
Maine	251	473,188	73	171,223	178	301,965
New Hampshire	242	235,810	59	112,240	183	123,570
Vermont	206	167,816	60	114,701	146	53,115
Massachusetts	347	343,939	32	161,977	315	181,962
Rhode Island	59	30,188	5	3,285	54	26,903
Connecticut	123	136,423	20	81,405	103	55,018
Middle Atlantic						
New York	525	1,542,983	177	1,234,460	348	308,523
New Jersey	34	18,902	10	8,658	24	10,244
Pennsylvania	48	169,996	41	165,055	7	4,941
East North Central						
Ohio	24	29,753	16	24,486	8	5,267
Indiana	20	29,199	13	25,489	7	3,710
Illinois	41	85,002	15	73,591	26	11,411
Michigan	106	281,618	88	242,052	18	39,566
Wisconsin	151	404,282	80	260,208	71	144,074
West North Central						
Minnesota	58	211,850	37	151,917	21	59,933
Iowa	49	177,280	36	175,010	13	2,270
Missouri	7	17,970	5	17,670	2	300
North Dakota	1	245	0	0	1	245
South Dakota	8	18,171	4	6,050	4	12,121
Nebraska	40	19,716	25	16,316	15	3,400
Kansas	20	14,504	10	9,901	10	4,603
South Atlantic						
Delaware	9	3,133	0	0	9	3,133
Maryland	19	7,230	6	2,120	13	5,110
D. C	4	666	0	0	4	666
Virginia	69	109,798	33	82,656	36	27,142
West Virginia	11	14,711	6	8,446	5	6,265
North Carolina	70*	431,500	30	246,400	40	185,100
South Carolina	22	357,510	17	348,750	5	8,760
Georgia	52	364,394	34	350,320	18	14,074
Florida	3	7,036	3	7,036	0	0
East South Central						
Kentucky	5	1,256	2	352	3	904
Tennessee	25	128,465	18	127,439	7	1,026
Alabama	20	215,863	12	196,025	8	19,838
Mississippi	0	0	0	0	0	0
West South Central						
Arkansas	2	1,189	1	720	1	469
Louisiana	0	0	0	0	0	0
Oklahoma	4	1,718	4	1,718	0	0
Texas	21	13,820	7	10,077	14	3,743
Mountain						
Montana	29	345,040	27	343,100	2	1,940
Idaho	46	270,918	42	269,021	4	1,897
Wyoming	10	7,886	9	7,560	1	326
Colorado	52	87,978	28	77,880	24	10,098
New Mexico	5	1,322	5	1,322	0	0
Arizona	8	38,760	8	38,760	0	0
Utah	66	115,329	51	110,344	15	4,985
Nevada	10	13,550	8	12,950	2	600
Pacific						
Washington	70	480,356	63	469,139	7	11,217
Oregon	74	206,865	52	147,620	22	59,245
California	145	1,451,880	118	1,432,748	27	19,082

Outlying Possessions	Developed Water Power (In Horse Power)
Alaska	40,000
Hawaii	25,000
Porto Rico	15,000

* Approximate

POTENTIAL WATER POWER RESOURCES OF THE UNITED STATES

State and division	Available 90 per cent of the time		Available 50 per cent of the time	
	Horse power	Per cent	Horse power	Per cent
United States	84,818,000	100.00	55,030,000	100 00
New England	998,000	2.87	1,978,000	3.60
Middle Atlantic	4,317,000	12.40	5,688,000	10.35
East North Central	737,000	2.12	1,391,000	2.53
West North Central	871,000	2.50	1,844,000	3.35
South Atlantic	2,476,000	7.11	4,464,000	8.11
East South Central	1,011,000	2.90	2,004,000	3.64
West South Central	434,000	1.25	888,000	1.61
Mountain	10,736,000	30.83	15,513,000	28.19
Pacific	13,238,000	38.02	21,260,000	38.63
New England				
Maine	536,000	1.54	1,074,000	1.95
New Hampshire	186,000	.53	350,000	.64
Vermont	80,000	.23	169,000	.31
Massachusetts	106,000	.31	235,000	.43
Rhode Island	25,000	.07	40,000	.07
Connecticut	65,000	.19	110,000	20
Middle Atlantic				
New York	4,010,000	11.52	4,960,000	9 03
New Jersey	50,000	.14	90,000	16
Pennsylvania	257,000	.74	638,000	1.16
East North Central				
Ohio	55,000	16	166,000	.30
Indiana	40,000	.12	110,000	.20
Illinois	189,000	54	361,000	.66
Michigan	168,000	48	274,000	.50
Wisconsin	285,000	.82	480,000	.87
West North Central				
Minnesota	203,000	.58	401,000	.73
Iowa	169,000	.49	395,000	.72
Missouri	67,000	.19	152,000	.27
North Dakota	82,000	.23	193,000	.35
South Dakota	63,000	.18	110,000	20
Nebraska	183,000	53	342,000	62
Kansas	104,000	.30	251,000	.46
South Atlantic				
Delaware	5,000	.01	10,000	.02
Maryland and District of Columbia	106,000	.30	238,000	.43
Virginia	459,000	1 32	812,000	1.48
West Virginia	355,000	1 02	980,000	1.78
North Carolina	540,000	1 55	816,000	1 48
South Carolina	429,000	1.23	632,000	1 15
Georgia	572,000	1.65	958,000	1.74
Florida	10,000	03	18,000	.03
East South Central				
Kentucky	77,000	.22	184,000	33
Tennessee	432,000	1.24	710,000	1 29
Alabama	472,000	1.35	1,050,000	1 91
Mississippi	30,000	09	60,000	11
West South Central				
Arkansas	125,000	.36	178,000	32
Louisiana	1,000	.00	2,000	.00
Oklahoma	70,000	.20	194,000	.35
Texas	238,000	69	514,000	.94
Mountain				
Montana	2,550,000	7 32	3,700,000	6 72
Idaho	2,122,000	6 10	4,032,000	7 33
Wyoming	704,000	2 02	1,182,000	2 15
Colorado	765,000	2 20	1,570,000	2 85
New Mexico	116,000	.33	186,000	.34
Arizona	2,759,000	7.92	2,887,000	5.25
Utah	1,420,000	4.08	1,586,000	2 88
Nevada	300,000	.86	370,000	67
Pacific				
Washington	4,970,000	14.27	7,871,000	14.30
Oregon	3,665,000	10 53	6,715,000	12 20
California	4,603,000	13,22	6,674,000	12.13
Outlying Possessions				
Alaska	1,000,000		2,500,000	
Porto Rico	19,000		28,000	
Hawaii	100,000		200,000	

1923 about 18 per cent of the total for the United States.

Developed and Potential Water Power of the United States (1924). Early in 1924 the United States Geological Survey published a summary of developed water power in the United States which showed that there were then about 3200 water-power plants of 100 horse power or more, having a total capacity of installed water wheels of 9,086,958 horse power, an increase of about 1,160,000 horse power, or nearly 15 per cent over the total in 1921, which

was 7,926,958 horse power. Of the 1924 total 81 per cent was in public-utility plants and 19 per cent in manufacturing plants. The corresponding percentages in 1921 were 78 and 22. New York, with 1,542,983 horse power, was the leading State in developed water power; California, with 1,451,830, was a close second; Washington, with 480,356, was third; Maine, with 473,188, was fourth; and North Carolina, with 431,500, was fifth, displacing Montana, which ranked fifth in 1921. Water-power development in the New England, east north central, west north central, and mountain States had not kept pace with that in the other parts of the United States, as the following table shows.

DEVELOPED WATER POWER IN SPECIFIED DIVISIONS OF THE UNITED STATES, IN 1921 AND 1924

Division	Percentage of total in U. S.		Difference
	1921	1924	
New England	16.5	15.3	−1.2
Middle Atlantic	18.7	19 1	+ .4
East North Central	9.3	9.1	− .2
West North Central	5.6	5 1	− .5
South Atlantic	13.6	14 3	+ .7
East South Central	3 1	3.8	+ .7
West South Central	.2	.2	0
Mountain	10.4	9 7	− .7
Pacific	22.6	23.5	+ .9

* Plus sign indicates increase; minus sign, decrease.

WATERS, HENRY JACKSON (1865–). An American educator and editor born at Center, Mo., and educated at the University of Missouri and in Germany and Switzerland. He was connected with the Missouri Agricultural Experiment Station and from 1892 to 1895 was professor of agriculture at the Pennsylvania State College. Professor Waters was director of the Missouri State Agricultural Exhibition at the St. Louis Exposition in 1904, and from 1895 to 1909 he was director of the Experiment Station and professor of agriculture at the University of Missouri. From 1909 to 1917 he was president of the Kansas State Agricultural College and in 1918 became managing editor of the Kansas City *Weekly Star*. He was commissioner to the Philippines to report on agricultural and educational development and was a member of several State agricultural boards. During the War he was Federal Food Administrator. He wrote *The Essentials of Agriculture* (1915); *The Development of the Philippine Islands* (1915), and *Laboratory Manual of Agriculture*, with J. D. Elliff (1918).

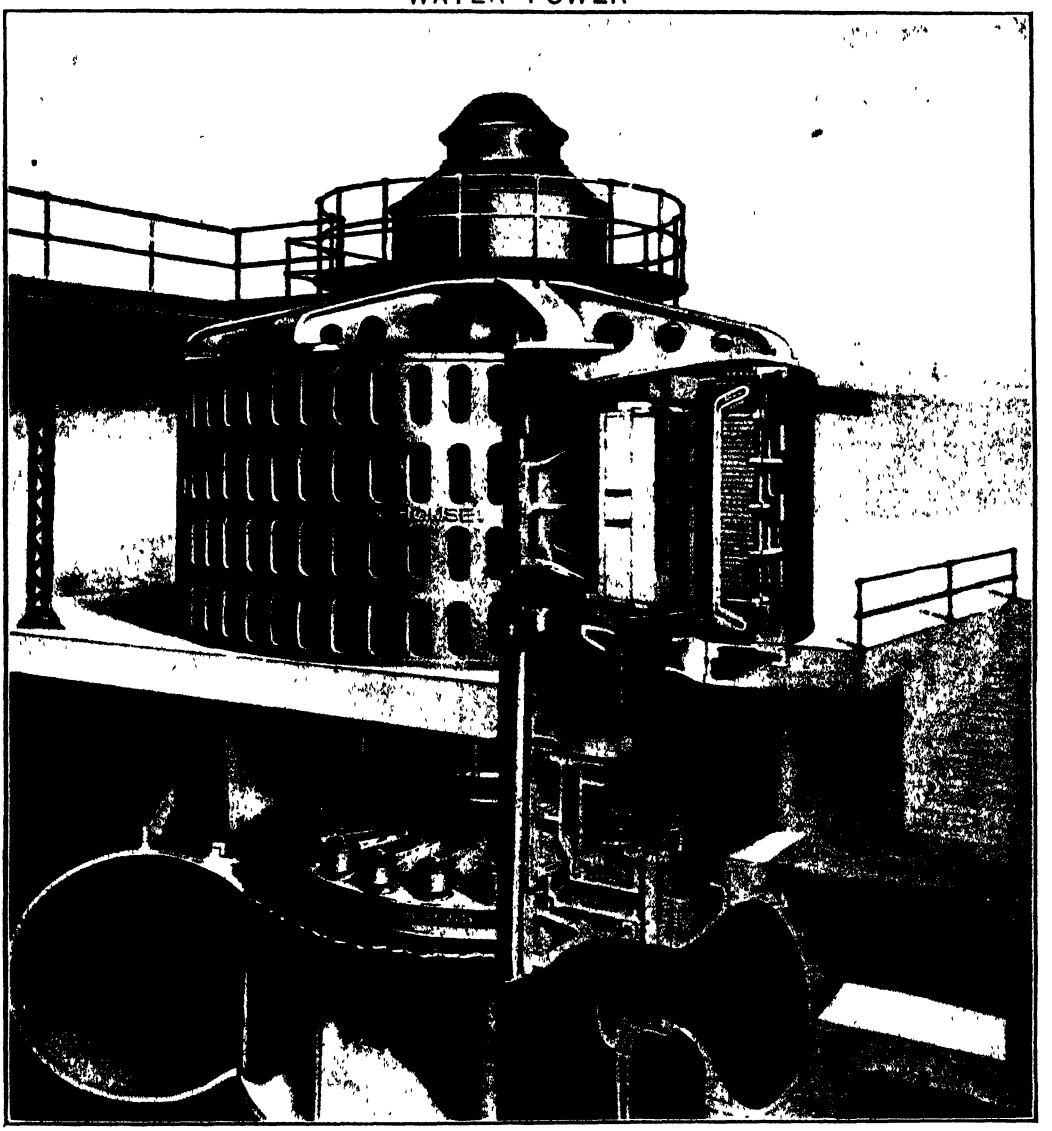
WATER SUPPLY. See WATER WORKS AND WATER PURIFICATION.

WATERWAYS. See CANALS.

WATER WHEELS AND TURBINES. In the interval between 1914 and 1924 many important improvements were made in water wheels and turbines so that more efficient types were developed and greater capacities secured which were needed with the large power plants which were being built. By 1924 there were 3200 water-power plants of 100 horse power or more in the United States with a total capacity of installed water wheels of all types of 9,086,958 horse power, an increase of some 1,160,000 horse power, or nearly 15 per cent over the total in 1921. Of the 1924 total, 81 per cent was in public-utility plants and 19 per cent in manufacturing plants. The year 1923 was one of unprecedented activity in hydroelectric development in the United States and Canada. It was stated in *Power* (New York) that contracts for over 2,000,000 horse power of hydraulic turbines were placed in the two countries. One company alone had contracted to manufacture some 61 units for 31 plants to aggregate over 500,000 horse power, while another manufacturing corporation had contracts for more than 380,000 horse power. Of the new business of the year, nearly 1,000,000 horse power of hydraulic turbines were manufactured for the Dominion of Canada, and 750,000 horse power was to be installed in the provinces of Ontario and Quebec. Actual construction of hydroelectric plants either completed or in progress in the United States totaled over 2,000,000 in 1923. Both new plants and extensions to old installations were included in this total.

Hydraulic turbines are roughly divided into two main groups, reaction and impulse turbines. The reaction turbines are those in which the water enters the turbine runner when only a part of its energy has been converted into velocity; in the impulse turbines, the water strikes under atmospheric pressure when all its energy has been converted into velocity. The former type is the most used; both kinds are built in ever-increasing sizes. Thus in 1923 a 70,000 horse power turbine was placed in service at the No. 3 Plant of the Niagara Falls Power Company, and while this was the largest single unit to be installed up to 1924, it was typical of the tendency of the larger hydroelectric plants to provide as much capacity as possible in a single unit of large capacity.

The increase in the capacity of water wheels and their improvement was a natural result of the incentive to make every possible use of water power wherever available which came with the increased costs of fuel. (See WATER POWER.) For this reason not only were new installations made, but in many of the older plants new working parts were installed with the object of modernizing the equipment and securing larger power output and greater operating efficiency. The use of large single units practically began during the period under consideration, especially in the United States. Thus in 1916 the Tallahassee Power Company installed at its Yadkin River development in North Carolina three turbines which gave 31,000 horse power under an effective head of 180 feet and at 154 revolutions per minute. These were the largest units of the single-runner Francis type that had been built up to this time. Greater heads were used, as in 1918 at the White River generating station of the Puget Sound Traction Light and Power Company, where an output of 25,000 horse power was secured in a unit working under a head of 440 feet. This was part of an installation which numbered among its consumers of electric power the Coast Division of the Chicago, Milwaukee, and St. Paul Railway This head was exceeded in 1921 at the Kern River Plant No. 3 of the Southern California Edison Company, where two vertical-shaft 22,500-horse power Francis-type turbines were put into operation under an effective head of 800 feet. At this time were designed a group of 5 55,000-horse power reaction turbines, to work with an effective head of 305 feet, for the Queenston development of the Hydroelectric Power Commission of Ontario. By 1924 this installation had been increased to 8 units In 1921 there were installed at the new Caribou station of the Great Western Power Company



COURTESY WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY

HYDRO-ELECTRIC INSTALLATION AT THE NIAGARA FALLS POWER CO. PLANT

Diagrammatic view of No. 3 A unit including (above) a 32,000 Kv-a, 3-phase, 12,000 volts, vertical Westinghouse Waterwheel Generator operating at 150 revolutions per minute, and (below) a Morris Turbine

at Belden, Cal., two very large impulse wheel units rated at 30,000 horse power each; each unit consisted of two independent wheels mounted on each side of the generator and operating under a head of 1008 feet at 171 revolutions per minute. The high-head impulse wheels found favor on the Pacific Coast, and among the important units of this type installed in 1924 were four 25,000-horse power units in the Moccasin Creek plant of the San Francisco development of the Hetch Hetchy project with a head of 1200 feet, a new unit for the Caribou station already mentioned, and a 22,500-horse power unit of the Southern California Edison Company operating on a head of 1900 feet.

As distinct from these high-head impulse wheels, other modern developments were those with propeller type runners such as the two 28,000-horse power units in the Great Falls plant of the Manitoba Power Company, which in 1923 were working under a head of some 22 feet, but which with the completion of the rock-fill section of the dam would run with a head of 56 feet. A novel form of propeller-type runner was in use in Sweden; its blades were adjustable, so as to take care of variation in load. One particular unit of this type had its runner 19 feet in diameter and operated under a head of 21.25 feet. It was of 11,500-horse power capacity. In the La Gabelle development of the Shawinigan Water and Power Company on the St. Maurice River in Quebec, four 30,000-horse power propeller-type turbines were designed to operate under a 60-foot head. These not only were the largest units of this type built up to 1924 but were designed to operate under a higher head than had been previously attempted with machines of this class.

In 1924 there was built for the Oak Grove plant of the Portland Railway, Light, and Power Company in Oregon, a 35,000-horse power Francis-type turbine to operate under a head of 850 feet and to run at a speed of 514 revolutions per minute. Previously, two 25,000-horse power turbines had been built to operate with a head of 810 feet, so that the new unit had the record in this respect. It was one of a group of three ultimately to be installed in the power plant mentioned. At the Pitt River No. 3 hydroelectric plant of the Pacific Gas and Electric Company, three 33,000-horse power vertical Francis turbines were installed to operate under an effective head of 280 feet. At the No. 3 plant of the Niagara Falls Power Company, its first 70,000-horse power turbine, referred to above, designed to operate under a head of 214 feet and to run at 107 revolutions per minute, was put into service on Dec. 18, 1923, and the other two new units in this extension were completed in 1924. These turbines were the largest in capacity up to the time of their installation. Another large hydroelectric plant where new units were installed in 1923 was that of the Ontario Hydroelectric Power Commission at Queenston Here eight units of 60,000 horse power each had been provided for, and Nos. 5 and 6 were installed during 1923, while foundations for Nos. 7 and 8 had been completed so that these units could be placed and put into operation in 1924.

One of the important developments in connection with water-power plants was the increased use of automatic and remotely controlled hydroelectric stations. For example, at the Searsbury station of the New England Power Company, a 7500-horse power Francis turbine was directly connected to a 5000-kilovolt-ampere generator, which from a stationary condition could be put into operation, so as to supply current to the line in 35 seconds. Likewise a smaller unit with a generator of 1500-kilovoltampere capacity with automatic control was installed by the Adirondack Power and Light Corporation, while at another plant, two 4000-kilovoltampere waterwheel generators were employed with full automatic and supervisory control. It was believed that stations with larger installations than any attempted were economically possible under these conditions and that such plants would continue to be built in increased numbers.

Bibliography. Among the more notable new books dealing with turbines and hydraulic machinery generally were: Church, *Hydraulic Motors;* Mead, *Water Power Engineering*, 2d ed. (New York, 1915); Lof and Rushmore, *Hydroelectric Power Stations*, 2d ed. (New York, 1924); Camerer, *Wasserkraft Maschinen.* Also, for convenient reference, consult Kent, *Mechanical Engineers' Handbook*, 10th ed. (New York, 1923).

WATER WORKS AND WATER PURIFICATION. In number of places and number of population supplied, as well as in general efficiency and vital relations to the health and safety of the public, water works lead among the municipal enterprises of the United States. The number of municipalities actually served with public water supplies in 1924 was unknown, but taking into account the rate of growth indicated by the various issues of *The Manual of American Water Works* (1897, the latest) and *The McGraw Water Works Directory* (1915), it may be assumed that some 10,000 places enjoyed public water supplies. Many of these places were supplied from works outside their boundaries and several by private companies. In number of separate municipalities supplied, the Hackensack Water Company held the lead; it supplied some 50 different municipalities in northeastern New Jersey. A much larger population, although fewer separate municipalities, was supplied by State-built works in the Boston metropolitan district, operated under the direction of the Metropolitan District Commission. Both the first cost and operating expenses of these works are met by the municipalities, to which the water is delivered wholesale by meter measurement.

By far the greater part of the entire water supply in all countries of the world is drawn from surface sources, but considerable areas are favored with underground water drawn from springs and wells, some of the latter tapping artesian sources. Broadly speaking, water supplies drawn from surface sources are subjected to some degree of purification—filtration in Europe and largely also in the United States and Canada, with chlorination widely used in the two latter countries and gradually being introduced in England as a finishing process or insurance against stray disease-producing bacteria that may have escaped the filters. Chlorination is also extensively used in the United States where filtration has not been introduced. The chlorinating plants are relatively inexpensive in both first and operating cost. More than 50 of these were installed on the New York water supply; they ranged from capacities of

hundreds of millions of gallons a day on the Catskill Aqueduct supply down to small plants in other parts of the water-works system. New York City, Boston, San Francisco, Los Angeles, Portland, and Seattle are exceptional among larger American cities in not having filtration plants for their surface water supplies drawn from streams, and so are Chicago and Milwaukee among the cities on the Great Lakes. Nearly all the filtration plants of later construction in the United States and Canada have been of the rapid or mechanical type as compared with the slow sand filters most commonly used in England and introduced quite largely in the United States from the early 1890's onward for some 10 or 15 years. Water softening, long common in England, was introduced somewhat sparingly in the United States but was adopted in connection with a number of the mechanical filtration plants in the later years of the decade 1914–24. In the case of some underground water supplies, aëration and filtration plants were built for the removal of iron and manganese; a notable instance was recorded by Lowell, Mass., which in 1914 let a contract for a plant of this kind with a capacity of 10,000,000 gallons per day. An iron removal plant at Berlin, Germany, was described in *The Engineering News-Record* (Sept. 13, 1923).

Aside from the rapid introduction of chlorination and the increase in filtration plants, the most notable change in water-works systems during the decade was the substitution of centrifugal for reciprocating pumps. The centrifugal pumps, except in the rare cases where water power is directly available, are most frequently driven by steam turbines; but many of the later installations of centrifugal pumps are electric-driven. Cast iron remained by far the most widely used material for water pipe distribution systems. To keep down waste and to distribute justly the cost of the service according to the volume of water wasted and used, meters were becoming more and more common; many cities had practically all consumers metered. Meter rates or charges were being simplified by the elimination of the many slides in the old sliding scales. After careful committee work, both the American and the New England Water Works Associations adopted standard specifications for water meters and a standard basis of charging for water supplied through meters. Under the standard meter charge plan there is first of all a yearly, quarterly, or monthly stand-by charge, regardless of the quantity of water used. This is designed to take care of the large capital expense required to make a water-works system available regardless of how much or little water is used by a given consumer. For water actually consumed, there is a higher charge for relatively small quantities between a stated range, a low charge for large volumes, and also an intermediate charge.

Bibliography. Consult Flinn, Weston, and Bogert, *Water Works Handbook* (New York); Wegmann, *Conveyance and Distribution of Water* (New York); Hazen, *Meter Rates for Water Works*. See also AQUEDUCTS; MUNICIPAL OWNERSHIP; SEWERAGE AND SEWAGE TREATMENT.

WATSON, JAMES E. (1864–). An American public official, born at Winchester, Ind., and educated at De Pauw University. He began the practice of law in 1886 in his father's office. He was elected a member of the fifty-fourth, fifty-sixth, and sixtieth Congresses and was a candidate for the governship of Indiana in 1908. In 1916 he was elected United States Senator to fill the unexpired term of Benjamin F. Shively, deceased, and was reëlected for the term 1921–27.

WATSON, JOHN (1847–). A Canadian professor of philosophy (see VOL. XXIII). He published a volume of political philosophy, *The State in Peace and War* (1919), and in 1922 was honored by a collection of testimonial essays written by his former students.

WATSON, JOHN BROADUS (1878–). An American psychologist (see VOL. XXIII). He resigned from the faculty of Johns Hopkins University in 1920 and became consulting psychologist for a prominent advertising agency. In 1921 he joined the staff of the New School for Social Research (New York City), and lectured on behaviorist psychology. His work on *Psychology from the Standpoint of a Behaviorist* (1919) was instrumental in directing a movement on the part of American psychologists away from introspection to the empirical observation of external behavior. See BEHAVIORISM.

WATSON, THOMAS EDWARD (1856–). An American politician and writer (see VOL. XXIII). In 1916 he was for the third time tried for the publication of three chapters in his book, *The Roman Catholic Hierarchy*, and was finally acquitted. In 1917 he opposed conscripting soldiers for service abroad, and his magazines were barred from the mails.

WATSON, THOMAS LEONARD (1871–). An American geologist, born in Chatham, Va., and educated at the Virginia Agricultural and Mechanical College and later at Cornell University. During 1890–05 he was assistant chemist at the Virginia Experiment Station and during 1891–95 he was instructor in geology at his alma mater and during 1904–07 professor there. Meanwhile (1901–04) he held the chair of geology at Denison University and (1907–10) that of economic geology at the University of Virginia, where since 1910 he has also been head professor of the school of geology. In addition to many articles on geological subjects contributed to various journals and reports of surveys with which he has been connected, he was associated with H. Ries in the authorship of *Engineering Geology* (1914) and *Elements of Engineering Geology* (1921).

WATTS, MARY STANBERY (MRS. MILES TAYLOR WATTS) (1868–). An American novelist (see VOL. XXIII). Her later works include: *Three Short Plays* (1917); *The Boardman Family* (1918); *From Father to Son* (1919); *The Noon Mark* (1920); and *The House of Rimmon* (1922).

WAUGH, FRANK ALBERT (1869–). An American horticulturist, born at Sheboygan Falls, Wis., and educated at the Kansas Agricultural College and at Cornell University and in Germany. For several years he was engaged in newspaper work and from 1902 was professor of horticulture and landscape gardening at the Massachusetts Agricultural College. Professor Waugh was a member of several agricultural societies and wrote: *Landscape Gardening* (1898); *The Landscape Beautiful* (1910); *Beginner's Guide to Fruit Growing* (1912); *Rural Improvement* (1914); *Outdoor Theatres* (1917); and *Downing's Landscape Gardening* (1921). He was also landscape engineer col-

laborating with the United States Forest Service and in 1918–19 captain in the Sanitary Corps of the United States Army.

WEATHER AND WEATHER FORECASTING. See METEOROLOGY.

WEBB, BEATRICE (1858–). An English economist and author (see VOL. XXIII). She was a member of several important committees during and after the War, including the Reconstruction Committee in 1917–18, the war cabinet committee on women in industry in 1918–19, and the Lord Chancellor's advisory committee for women justices in 1919–20. In 1919 she wrote *Men's and Women's Wages: Should They Be Equal?*

WEBB, SIDNEY (1859–). An English economist and Socialist (see VOL. XXIII). His later works include *Toward Social Democracy* (1916), *The Works Manager To-day* (1917); *Story of the Durham Miners* (1921); *Fabian Essays, Edition of 1920.* He edited *How to Pay for the War* (1916). In collaboration with his wife, Beatrice Webb (q.v.), he also published *A Constitution for the Socialist Commonwealth of Great Britain* (1920) and *English Prisons under Local Government* (1922). In 1924 he became a member of the Macdonald government with the portfolio of President of the Board of Trade.

WEBB-POMERENE ACT. See TRUSTS.

WEEKS, JOHN WINGATE (1860–1926). An American banker and legislator (see VOL. XXIII). He succeeded Winthrop Murray Crane as United States Senator in 1913 but failed of reëlection in 1919. During the War he assisted in investigations which resulted in the reorganization of the ordnance and quartermaster departments and also of the aircraft production board. President Harding appointed him Secretary of War in 1921.

WEINGARTNER, FELIX (1863–). An Austrian musical conductor (see VOL. XXIII). From 1919 to 1924 he was chief conductor and general director of the Volksoper at Vienna. In the fall of 1924 he entered on his duties as general director of the Deutsches Opernhaus in Charlottenburg (Berlin). His recent works include two operas, *Meister Andrea* and *Terokayn* (both produced in Vienna, 1920); an overture, *Aus Schwerer Zeit;* and a second violin concerto.

WEINMAN, ADOLF ALEXANDER (1870–). An American sculptor (see VOL. XXIII). Among his recent works are a bronze statue of Lincoln in the Capitol at Frankfort, Ky.; the pediment group of the Capitol at Madison, Wis., and several war memorials. His most important recent decorative works were the sculptures for the Pennsylvania Station in New York City, culminating in the bronze statue of Alexander J. Cassatt (1923), and the sculptures for the Municipal Building, New York City. He recently became well-known as a medalist, having designed besides others the medals of the National Institute of Arts and Sciences, the American Numismatic Society (1920), and the dime and half-dollar of the national currency.

WEISMANN, THEORIES OF. See HEREDITY.

WELCH, WILLIAM HENRY (1850–). An American pathologist (see VOL. XXIII). Professor Welch has collected and published many individual contributions with the title *Papers and Addresses* (1920) and assumed the editorship of the *American Journal of Hygiene* (1921).

WELDING, ELECTRIC. See ELECTRIC WELDING.

WELFARE LEGISLATION. See CHILD LABOR.

WELLER, STUART (1870–). An American geologist, born in Maine, N. Y., and educated at Cornell and Yale Universities. In 1895 he became connected with the University of Chicago, where since 1915 he has been professor of palæontological geology. In addition to his professional work he has had wide experience on State geological surveys. He was also assistant geologist on the United States Geological Survey during 1901–06 and since then has been geologist. His specialty is palæozoic palæontology, particularly in its relation to geologic problems. In addition to papers on geological subjects he is the author of many reports on palæontology contributed to the publications of the national and State geological surveys with which he has been connected.

WELLESLEY COLLEGE. An institution for women at Wellesley, Mass., founded in 1875. The enrollment of students in 1914 was 1452 as compared with 1630 in 1923–24, the faculty numbered 140 in the earlier year as compared with 145 in the latter, and the library was increased from 80,000 to 109,444 volumes. In 1914 the main building of the college burned, and in the following years two dormitories, Tower Court, given by Mrs. Ellen Stebbins James, and Claflin Hall, named in memory of Governor and Mrs. Claflin; Founder's Hall, a recitation hall; the student alumnæ building, and two faculty residence buildings were constructed. A $2,000,000 endowment fund was raised, to which the Rockefeller Foundation gave $750,000; the General Education Board, $200,000; two anonymous donors, $100,000 each; and Andrew Carnegie, $95,000. The total endowment in 1923 amounted to $4,283,224. President, Miss Ellen Fitz Pendleton, M.A., LL.D.

WELLESZ, EGON (1885–). An Austrian composer and musicologist, born at Vienna. He studied there under Arnold Schönberg (counterpoint) and Bruno Walter (composition), at the same time taking courses in musicology at the university under Professor Adler. In 1911 he became professor of the history of music at the Neues Konservatorium in Vienna. His literary essays, contributed to various important musical journals, deal mainly with Byzantine and Oriental music. As a composer he is a follower of his teacher, Schönberg, and an extreme futurist. His compositions consist of an opera, *Prinzessin Girnara* (Frankfort, 1921); the ballets *Diana, Persisches, Achilles auf Skyros;* a symphonic poem, *Vorfrühling;* four string quartets; piano pieces; and many songs.

WELLS, FREDERIC LYMAN (1884–). An American psychiatrist (see VOL. XXIII). He was attached to the McLean Hospital at Waverley, Mass., from 1918 to 1921, and in 1921 he became consulting psychologist at the Boston Psychopathic Hospital and instructor at the Harvard Medical School. His works after the War include *Mental Adjustments* (1917) and *Pleasure and Behavior* (1923).

WELLS COLLEGE. An institution for women founded in 1868 at Aurora, N. Y. As the number of students was limited, the student body increased only slightly, from 194 in 1913 to 219 in 1923, and the faculty from 34 to 39 members. The number of volumes in the li-

brary rose from 25,160 to 44,861. Largely through two endowment drives, one for $500,000 and one for $1,000,000, the funds of the college were increased from $361,800 to $1,153,290; of this sum the General Education Board contributed $300,000. The comprehensive examination system for matriculation was adopted, honors courses instituted, and a modification of the group system put in force A wing was added to Glen Park, six cottages were bought, and an athletic club house was received from R. L. Zabriskie. The campus was increased from 76 to 280 acres. President, Kerr D. Macmillan, S.T.D.

WELLS, H(EBERT) G(EORGE) (1866–). An English novelist (see VOL. XXIII). During the War and after, he wrote several serious works which achieved wide circulation and added considerably to his already high reputation. These included: *Mr. Britling Sees It Through* (1916); *The Elements of Reconstruction*, under the pseudonym D. P. (1916); *War and the Future; God, the Invisible King; The Soul of a Bishop* (1917); *In the Fourth Year*, on the League of Nations; *Joan and Peter* (1918); *The Undying Fire* (1919); *The Outline of History; Russia in the Shadows* (1920); *The Salvaging of Civilization* (1921); *The Secret Places of the Heart; Washington and the Hope of Peace; A Short History of the World* (1922); *Men like Gods* (1923); *The Dream* (1924)

WENCKEBACH, KARL FRIEDRICH (1864–). An Austrian physician, known chiefly as a prominent member of the later school of cardiac specialists which came into being as the result of improved methods of diagnosis. He received his medical degree from the University of Vienna and was made a professor of internal medicine there. His first work on the heart was *Die Arrhythmie als Bestimmter Funktionsstörungen des Herzens* (1903), which appeared in English translation; and in 1914 he added *Die Unregelmassige Herzthatigkeit.* Dr. Wenckebach lectured in the United States after the War.

WERFEL, FRANZ (1890–). An Austrian poet and dramatist, born at Prague, and educated there and in Leipzig. He became a reader for the publishing house of Kurt Wolff in Munich. He is the author of *Der Weltfreund* (1911); *Wir Sind* (1913); *Einander* (1915); *Die Troerinnen* (1915), *Gesange aus den Drei Reichen* (1917); *Der Gerichtstag* (1919); *Besuch aus dem Elysium* (1919); *Nicht der Morder, der Ermordete Ist Schuldig* (1920); and the dramas, *Spiegelmensch* (1920), and *Bocksgesang* (1922), which have had a sensational success. See GERMAN LITERATURE.

WERRENRATH, REINALD (1883–). An American concert baritone, born in New York City. He studied first with his father, then with C. Dufft, A. Mees, and Percy Rector Stephens, and made his début at the Worcester Festival of 1907. He then made several transcontinental tours and everywhere met with enormous success. In 1918–19 he was a member of the Metropolitan Opera Company. He is especially fine in oratorio. He has written some male choruses and edited a collection of modern Scandinavian songs.

WERTHEIMER, MAX (1880–). A German psychologist, born at Prague, and educated in philosophy and psychology at the Universities of Prague and Berlin. He performed experiments at the Psychological Institutes of Berlin and Würzburg. He was professor at the University of Berlin and one of the editors of the review, *Psychologische Forschung.* His published monographs deal largely with the perception of movement, which he investigated from a new point of view. He was one of the leaders of the school of *Gestaltpsychologie*, or psychology of forms. His works include: *"Experimentelle Studien über das Sehen von Bewegung"* (*Zeitschrift fur Psychologie*, 1912); *"Untersuchungen zur Lehre von der Gestalt"* (*Psychologische Forschung*, 1922); and a doctoral dissertation, *Experimentelle Untersuchungen zur Tatbestandsdiagnostik.*

WESLEYAN METHODIST CHURCH OR CONNECTION OF AMERICA. An outgrowth of a society formed in Michigan in 1841, this denomination was established in 1843 at Utica, N. Y. In doctrine it is in accord with Methodist bodies generally throughout the world. The membership of the church increased slightly from 20,000 in 1914 to 20,939 in 1923, while the number of pastors declined from 840 to 628, and the number of societies from 675 in 1915 to 586 in 1923. The number of pupils in the Sunday schools increased from 29,038 in 1917 to 35,254 in 1923. In 1914 the denomination maintained three colleges and one theological seminary, in 1923, four colleges and the seminary. Home mission work was carried on throughout the decade in Alabama and the Blue Ridge Mountains, and foreign missions in Africa, India, and South America, and in Japan after 1919. Steps were taken at the 1923 General Conference toward the union of the Mennonite Brethren in Christ and the Pilgrim Holiness Church with the Wesleyan Connection.

WESLEYAN UNIVERSITY. A nonsectarian institution for the higher education of men at Middletown, Conn., founded in 1831. A sudden increase in the enrollment to nearly 600 men in 1919 demonstrated that without large additions to physical equipment and teaching staff the college could not give high-grade instruction to so large a number. The trustees therefore voted to limit the enrollment to 500 During the decade 1914–24 the number of members in the faculty was increased from 42 to 55, with 9 assistants, and the library was increased from 100,000 to 140,000 volumes. The Van Vleck Observatory, largely the gift of Joseph Van Vleck in memory of his brother, Prof. John Monroe Van Vleck, was opened in 1916; in the same year Mrs. Gardner Hall, Jr., gave $150,000 to build a chemistry laboratory in memory of her husband. Ralph Ensign and his son, Joseph R. Ensign, gave $30,000 to remodel the chapel, John Gribbel gave $10,000 for an organ; and the class of 1863 gave a set of chimes. The university received in 1923 from Mrs. Dexter Smith of Springfield, Mass., $175,000 toward the new library building. In the spring of 1922, William Arnold Shanklin, president of the university since 1909, successfully completed the campaign for adding $3,000,000 to the productive endowment. Dr. Shanklin was on leave of absence during the year 1922–23. In September, 1923, he resigned the presidency and was made president emeritus. Stephen Henry Olin was acting president in 1922–23 and Leroy Albert Howland in 1923–24.

WEST, REBECCA (1892–). An English author, educated at George Watson's Ladies' College in Edinburgh. In 1911 she became a

reviewer on the staff of the *Freewoman* and in 1912 began writing political articles for *The Clarion*. Later she wrote many articles for magazines and newspapers in England and America. Her books include: *Henry James* (1916); *The Return of the Soldier* (1918); *The Judge* (1922).

WEST AFRICA. See ASHANTI.

WESTERMANN, WILLIAM LINN (1873–). An American educator, born at Belleville, Ill., and educated at the University of Nebraska and in Berlin. For several years he was assistant at the University of Nebraska and taught in several schools in Illinois. He was instructor in Latin and Greek at the University of Missouri (1904–06), assistant professor of history at the University of Minnesota (1906–08), assistant professor of history at the University of Wisconsin (1908–20), and professor of ancient history at Cornell University (1920–). Later he came to Columbia. At the Peace Conference in Paris, he acted as adviser on Turkish matters and as chief of the division of western Asia. Professor Westermann wrote *Story of the Ancient Nations* (1912) and contributed to American historical and philological journals. He was also the author of *Westermann's Classical and Historical Map Series.*

WESTERMARCK, EDWARD ALEXANDER (1862–). A Finnish anthropologist (see VOL. XXIII). His recent works are *Marriage Ceremonies in Morocco* (1917); *The Origin and Development of Moral Ideas* (1917); and *The Belief in Spirits in Morocco* (1920).

WESTERN AUSTRALIA. A state of the Australian Commonwealth, occupying the entire western third of the continent. Area, 975,920 square miles; population in 1911, 284,114; in 1922, 339,501. Perth, the largest city, including its suburbs, had 154,866 inhabitants in 1921 (85,945 in 1911). Cultivation was spreading, there being 1,901,677 acres under crops in 1922 (1,537,922 acres in 1914). The wheat acreage continued to increase. Other agricultural products were oats, hay, barley, and fruits. The government, after the War, continued to apply itself to aiding settlers. Soldiers in particular were singled out for loans. Pastoral activities remained important. Sheep increased from 4,421,375 in 1913 to 6,506,177 in 1922. In 1921–22, 58,000,000 pounds of wool were exported. Gold production showed decreases over the period; the output of 1921 was valued at £2,352,098 as compared with £5,237,351 in 1914. There was a falling off in total mineral production: total value in 1913, £6,036,265; in 1921, £2,880,169. Value of production for 1920: agricultural, £8,733,000; pastoral, £4,380,000; dairying, £1,033,000; forestry and fisheries, £1,850,000; mining, £3,259,000; value added by manufacture, £3,718,000; total, £22,973,000. Imports and exports for 1914 were £8,960,397 and £8,406,182; for 1921–22, £12,037,779 and £13,628,883. Government accounts showed: revenues and expenditures for 1913–14, £5,205,343 and £5,340,754; for 1921–22, £6,907,107 and £7,639,242. The public debt of £30,728,078 in 1914 mounted to £58,485,854 in 1923. Railroad construction continued. Railway lines in 1922 totaled 3539 miles (2967 miles in 1914).

WESTERN COLLEGE FOR WOMEN. An institution at Oxford, Ohio, founded in 1855. The student enrollment increased from 260 in 1914 to 330 in 1923–24, the faculty was increased from 28 to 36 members, and the number of volumes in the library from 20,000 to 30,000. The productive endowment grew from $250,000 to $700,000. A new dormitory and a stone chapel were built during the period. President, William W Boyd, A.B., A.M., Ped.D.

WESTERN RESERVE UNIVERSITY. A nonsectarian institution at Cleveland, Ohio, founded in 1826. It included two colleges of liberal arts and sciences, Adelbert College for men and the College for Women, with 815 undergraduates in 1914, and 1500 in 1923–24; and five professional schools with 544 students enrolled in 1914, and seven professional schools, with 841 enrolled in 1923-24. The summer school in 1923 enrolled 1242 students, in association with the Cleveland School of Education. Under the same joint jurisdiction, 92 teachers in service were taking courses in 1923–24, and 343 students were enrolled in evening courses in business administration and chemistry. During the decade the faculty was increased from 228 to 478 in the regular staff, and the libraries from 82,000 to 163,000 volumes. The endowment in 1914 was $3,521,081.22, as compared with $4,403,282.07 in 1922–23, and the income was $269,006 10 in the earlier year as compared with $967,423.58 in the later. Twelve acres adjoining the main campus were bought for the School of Medicine in 1915, and in 1921 Samuel Mather gave $500,000 to assure the removal of the school to the new site. In the following year he pledged himself for the entire cost of the new buildings, which were expected to be completed early in 1924. The plans for the new campus included a hospital group consisting of Lakeside Hospital, the Babies' Dispensary and Hospital, and the Maternity Hospital; building of the two last mentioned was begun in 1923. New buildings constructed since 1914 include Flora Mather House, a dormitory for women; a gymnasium for men; and laboratories for the School of Pharmacy and for the department of household administration of the College for Women. The entrance requirements of the undergraduate colleges were broadened in 1919 by an increase in the number of electives which might be offered, and a diminution in the number of prescribed subjects. In 1922 the Dental School increased its entrance requirements to include a year of college work, the School of Pharmacy instituted a four-year course leading to the B S. degree, and a department of nursing education was added. to the College for Women. In 1922 a course in business administration was added to the liberal arts curriculum, leading to the B.A. degree, and in 1923 the department of nursing education was organized as a separate school of the university with an initial endowment of $500,000, the gift of Mrs. Chester C. Bolton. On the retirement of Charles Franklin Thwing after 31 years' service as president, James D. Williamson became acting president in 1921 and continued in office until 1923, when Robert E. Vinson, until that time president of the University of Texas, was elected president.

WEST INDIES. See the articles on the island groups and the separate islands: BAHAMAS; BARBADOS; CUBA; JAMAICA; HAITI; PORTO RICO; LEEWARD ISLANDS; WINDWARD ISLANDS; TRINIDAD; VIRGIN ISLANDS; GUADELOUPE; MARTINIQUE.

WESTMINSTER COLLEGE. A coeducational United Presbyterian institution at New

Wilmington, Pa., founded in 1852. The student enrollment increased from 206 in 1914 to 340 in 1924, the faculty from 18 to 25, and the library from 12,000 to 13,300 volumes. The endowment rose from $150,000 to $500,000, and a Bible Chair fund of $40,000 was raised. The gymnasium was built in 1921. President, W. Charles Wallace, D.D.

WEST POINT. See UNITED STATES MILITARY ACADEMY.

WEST VIRGINIA. West Virginia is the fortieth State in size (24,170 square miles), and the twenty-seventh in population; capital, Charleston. The population increased from 1,221,119 in 1910 to 1,463,701 in 1920, a gain of 19.9 per cent. The white population increased from 1,156,817 to 1,377,235; negro, from 64,173 to 86,345; native white, from 1,099,745 to 1,315,329; foreign-born white, from 57,072 to 61,906. The urban population rose from 228,242 to 369,007; the rural, from 992,877 to 1,094,694. The growth of the principal cities was as follows: Wheeling, 1910, 41,641; 1920, 56,208; Huntington, 31,161 to 50,177; Charleston, 22,996 to 39,608.

Agriculture. Agriculture in West Virginia, between 1910 and 1920, showed a considerable decline in some of its phases Thus, while the population increased 19 9 per cent, the number of farms decreased 9.7 per cent (from 96,985 to 87,289); and the total area in farms decreased 4.6 per cent, from 10,026,442 to 9,569,790 acres. The improved land in farms remained practically unchanged: 5,521,757 acres in 1910 and 5,520,308 in 1920. The percentage of total land area in farms decreased from 65.2 to 62.2; while the proportion of improved land to total land area remained constant at 35.9 per cent. The total value of farm property showed an apparent increase of 57.7 per cent, from $314,738,540 to $496,439,617; the average value per farm, from $3255 to $5687. In interpreting these values, however, and, indeed, all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 87,289 farms in 1920, 72,101 were operated by owners, 1090 by managers, and 14,098 by tenants. The corresponding figures for 1910 were 75,978, 872, and 19,835. White farmers in 1920 numbered 86,785 and colored farmers 504. In 1910 white farmers numbered 95,977; colored, 708. In 1920, 52,617 farms were free from mortgage, 10,274 under mortgage; in 1910, 66,093 were free from mortgage, 9525 mortgaged. Cattle in 1920 numbered 587,462 (255,021 dairy cattle); in 1910, 620,288 (239,539 dairy cattle). Sheep numbered, in 1920, 509,831, compared with 910,360 in 1910; hogs, 305,211, compared with 328,188. The estimated production of the principal farm products in 1923 was as follows: corn, 20,152,000 bushels; wheat, 2,964,000; oats, 4,553,000, potatoes, 5,040,000; sweet potatoes, 362,000; tobacco, 7,529,000 pounds; and hay, 807,000 tons. Comparative figures, for 1913, are: corn, 22,692,000 bushels; wheat, 3,055,000; oats, 2,760,000; potatoes, 3,984,000; hay, 925,000 tons; and tobacco, 10,200,000 pounds.

Mining. West Virginia is second among the States in the value of its mineral products and second in the production of coal. Coal is by far its most valuable mineral although the output of natural gas, petroleum, and clay products is also of great importance. The progress of coal mining during the decade 1914–24 is indicated by the following production figures: 1914, 71,707,626 net tons, valued at $71,391,408; 1915, 77,184,069, $74,561,349; 1916, 86,460,127, $102,366,092; 1917, 86,441,667, $200,659,368; 1918, 89,935,839, $230,508,846; 1920, 89,970,707, $390,046,000; 1921, 72,786,996, $206,061,500; and 1922, 80,488,192 net tons. The greatly increased value of the coal produced in 1917 was due chiefly to conditions in the coal mining field which resulted in a greater demand for coal, and partly to the inflation of the currency which reduced the buying power of money and thereby increased prices. The production of natural gas, in which West Virginia ranks first, in 1914 was 236,489,175 thousand cubic feet; 1916, 299,318,907; 1918, 265,160,917; 1920, 239,718,800; and 1921, 174,920,800. In later years the production of natural gas gasoline was large and valuable: in 1920, 58,941,488 gallons; in 1921, 54,646,053. The production of petroleum was as follows: 1914, 9,680,033 barrels; 1916, 8,731,184; 1918, 7,866,628; 1920, 8,249,000; 1921, 7,822,000; and 1922, 7,021,000. Clay products increased from a value of $5,761,411 in 1914 to $7,634,321 in 1916; $10,988,677 in 1918; and $17,167,843 in 1920. In addition to the minerals mentioned above, the State produces also salt, sand and gravel, and stone. The total value of the mineral production in 1921 was $316,180,647, compared with $547,872,937 in 1920; $298,168,194 in 1919; $327,962,620 in 1918, and $133,633,229 in 1914.

Manufactures. West Virginia has many important industries. These had a steady growth from 1909. There were in the State, in 1920, 10 cities with more than 10,000 inhabitants, which contained 17.9 per cent of the total population and reported, in 1919, 41.2 per cent of the value of the State's manufactured products. There were in the State, in 1909, 2586 manufacturing establishments; in 1914, 2749; and in 1919, 2785. Persons engaged in manufacture numbered 71,463, 79,353, and 93,688; and the capital invested amounted to $150,922,586, $175,995,011, and $339,189,678, in those years. The value of products in 1909 amounted to $161,949,526; in 1914, $193,511,782; and in 1919, $471,970,877. The increase in value of products was, however, in great measure due to the change in industrial conditions brought about by the War and cannot be taken to indicate a proportionate increase in the manufactures during 1914–19; but the increase in number of persons employed clearly indicates a growth in the State's manufacturing activities. The principal industry in point of value of its product is the iron and steel and rolling mill, with an output valued in 1909 at $22,435,000; in 1914, $21,186,000; and in 1919, $85,036,000. Lumber and timber products rank second in point of value, amounting to $28,758,000 in 1909; $28,994,000 in 1914; and $46,314,000 in 1919. The manufacture of glass, third in value, had a product valued at $7,779,000 in 1909; $14,631,000 in 1914; and $42,730,000 in 1919. Wheeling and Huntington were the leading manufacturing centres. There were in Wheeling, in 1909, 176 manufacturing establishments, with a product valued at $27,077,000; in 1914, 201 with $27,879,000; and in 1919, 243 with $72,640,000. Parkersburg had, in 1909, 75 with

$5,498,000; in 1914, 83 with $7,143,000; and in 1919, 73 with $24,056,000.

Education. Much progress was made in the decade 1913–23, especially during its latter part, in the development and improvement of education. Among the notable features was the addition to the Department of Education of a supervisor of teacher training, a supervisor of health and sanitation, and a supervisor of physical education. A high school assistant supervisor and two rural professors were also added as part of the organization. The Legislature of 1919 passed three important measures: the teachers' salary law; a measure providing for the standardization of rural schools; and a law increasing the general school fund by $1,000,000 for each of the next two years. A high school movement in the State was increasing from year to year; the number of classified high schools rising from 171 in 1919–20 to 205 in 1922. The negro schools of the State made splendid progress during the decade. There were, in 1922, 16 recognized negro high schools, 6 of which were high schools of the first class. The enrollment in these schools had increased from 484 in 1919 to 903 in 1922. The development of vocational education kept pace with that of other branches. There was a very considerable enrollment in home economics, trades and industries, and mining and vocational agriculture. The Legislature of 1921 took an advanced step by passing what is known as the compulsory part-time law, requiring all cities with a population of 10,000 or more, and other industrial centres where as many as 50 young people are working under labor permits, to establish part-time schools or classes. In cooperation with the Federal government, the State Board of Education organized a civilian rehabilitation service, which was proving very effective in its operation. The total enrollment in the high and elementary schools in 1912 was 435,611; in 1922–23 it was 452,029. In the high schools, in the latter year, there were enrolled 29,334. The total colored enrollment in the elementary schools in 1921 was 18,979; in the high schools, 610. The total disbursements for public schools in 1922–23 amounted to $19,944,716. The percentage of illiteracy in the State decreased from 10.2 in 1910 to 8.2 in 1920: in the native white population, from 8.4 to 6.1; in the colored, from 24.2 to 18.9. In the foreign-born white population it increased from 23.9 to 24.5.

Finance. For finance, see STATE FINANCES.

Political and Other Events. The Democratic and Republican parties shared control in West Virginia in the decade 1914–24. On July 1, 1914, a drastic prohibition law went into effect, as a result of a State-wide prohibition amendment passed in 1912. The explosion at the New River Colliery Company's mines at Echo on Apr. 28, 1914, resulted in the death of some 180 miners, who were buried in the mine. In 1915 a report was made on the long-standing controversy between Virginia and West Virginia as to the liability of the latter in the State debt of Virginia before the separation of the two States. Charles D. Littlefield acted as special arbitrator and decided that West Virginia should pay between $12,000,000 and $18,000,000 as its share of the debt. He also declared that West Virginia should share in the assets, which he valued at $14,000,000. The Supreme Court, on June 14, 1915, decided the case by declaring that West Virginia should pay $12,393,929 as its net share of the debt at the time of the division of the States. In 1916, at the quadrennial elections for State officers, the Democrats, for the first time in two decades, elected their candidate for governor, John J. Cornwell. The Republicans elected their candidate for the United States Senate, Howard Sutherland. In the presidential voting of this year, Charles E. Hughes received 141,432 votes; President Wilson, 139,013. On Aug. 9, 1916, a cloudburst near Charleston destroyed many villages and caused a loss of 50 lives, with a property loss over $2,000,000. In 1918, Davis Elkins, Republican, was elected to the United States Senate. Elections for governor and other State officers were again held in 1920. E. F. Morgan, the Republican candidate, was elected governor. In the presidential voting of this year, W. G. Harding received 282,007 votes; J. M. Cox, 220,789. In May, 1921, as a result of disorders arising from strikes in the coal mines, Mingo County was placed under martial law by Governor Morgan. The strike was the result of an attempt to unionize the mines in this part of the State. The trouble continued until September, when the armed miners surrendered to Federal troops, who took charge of the situation. In 1922, M. M. Neely, Democratic candidate for Senator, was elected, defeating Senator Sutherland. The Democratic State committee, in May, 1924, endorsed John W. Davis as Democratic candidate for the presidency.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. In 1915 the Legislature enacted an amendment to the prohibition law and voted to submit to the people an amendment providing for woman suffrage. The Legislature of 1917 amended the election laws and passed a measure providing for the better protection of judges against personal violence. This Legislature refused to make provisions for the payment of the State's portion of the Civil War debt. The Legislature of 1919 provided for a constitutional amendment dividing the legislative session into two parts, the first, lasting 15 days, to be devoted to the introduction of bills; the second, after a recess, to be given to their consideration and final action. This Legislature authorized the creation of a State police force and enacted measures forbidding child labor. It also passed a measure providing for the compulsory school attendance of children under 14 years of age. A special session of the Legislature was held in 1920 to ratify the woman suffrage amendment. By virtue of a constitutional amendment ratified by the people in 1920, the Legislature of 1921 authorized the governor to issue $50,000,000 in bonds for permanent road improvement.

WEST VIRGINIA UNIVERSITY. A coeducational State institution at Morgantown, W. Va., founded in 1867. The student enrollment increased greatly during the decade between 1914 and 1924, with 775 registered in the first year and 2712 in the latter. The faculty membership was correspondingly increased from 80 to 216 and the number of volumes in the library from 47,000 to 70,000. Woman's Hall, Oglebay Hall, the medical building, and the Law School building were constructed during the period. A gift of valuable coal lands was received from Dr. I. C. White

and a farm and live stock from the estate of Lawrence A. Reymann. President, Frank Butler Trotter, LL.D.

WHARTON, EDITH (1862–). An American novelist (see VOL. XXIII). Her later books are: *Summer* (1917); *The Marne* (1918); *French Ways and Their Meaning* (1919); *The Age of Innocence* (1920); *Glimpses of the Moon* (1922); *A Son at the Front* (1923).

WHEAT. For the countries reporting their yields every year the production of wheat increased from an annual average of 1,500,000,000 bushels for the three years 1891–93 to 2,500,000,000 bushels for the three years 1919–21. In the United States production rose rapidly during the World War. For the years 1914–24 the average annual production was 837,464,000 bushels as compared with 681,368,000 bushels for 1904–13. The largest crop ever grown, 1,025,801,000 bushels, was produced in 1915 and the highest acreage, 73,099,421 acres, an increase of 20 per cent over any previous year, was harvested in 1919. The average annual yield of the leading States for 1914–23 was 115,968,000 bushels for Kansas, 83,703,000 bushels for North Dakota, and 56,595,000 bushels for Nebraska. The general effect of the war was to increase production and to limit consumption. The principal governments of the world passed laws requiring a maximum percentage of flour in grinding, prescribing minimum percentages of wheat flour substitutes in baking, placing wheat flour consumption on a rationing basis, regulating the trade in wheat and fixing the price. In the United States, wheat prices, beginning to rise with the outbreak of the War, had reached $1.40 per bushel by May, 1915. In 1917 the United States Food Administration fixed the price of Number One Northern Spring Wheat at $2.20 per bushel at Chicago with differentials for grades and other terminal markets. The price had reached $2.58 per bushel on June 1, 1920, a month before price fixation by the government terminated, and a downward movement began which, by December, 1921, had reduced the price to $.90 per bushel. In purchasing power the price of $.94 on Dec. 1, 1921, was below that of the low price of $.49 on Dec. 1, 1894.

The low prices for wheat and other farm products prevailing for a series of years while the things farmers had to buy remained practically at war-time price levels brought about a critical economic situation, especially in the spring wheat States, to the solution of which much thought and discussion were given. Congress revived the War Finance Corporation to assist in financing exportation, an Export Credit Corporation was launched, and other similar means were applied or proposed to alleviate the critical conditions. During this period cooperative marketing of products and purchasing of supplies was entered into by farmers more extensively than ever before. In Australia a system of selling wheat through state-controlled pools, inaugurated during the War, was continued after the War.

Standards and Grading. The United States Grain Standards Act of Aug. 11, 1916, authorized the Secretary of Agriculture to investigate the handling and grading of grain, establish official standards and license grain inspectors. Under this law all wheat in inter-State and foreign commerce is graded by the licensed inspectors according to the official wheat standards of the United States as revised and effective July 17, 1922. These standards, based on color and texture of kernels as indicating quality, comprise the following classes and subclasses:—Class I, hard red spring wheat, with subclasses (a) dark northern spring, (b) northern spring, and (c) red spring; Class II, durum wheat, with subclasses (a) amber durum, (b) durum, and (c) red durum; Class III, hard red winter wheat, including subclasses (a) dark hard winter, (b) hard winter, and (c) yellow hard winter; Class IV, soft red winter wheat, including subclasses (a) red winter, and (b) western red; and Class V, white wheat, with subclasses (a) hard white, (b) soft white, and (c) western white. Each subclass is divided into five grades, determined by test weight per bushel, moisture content, percentage of damaged kernels, purity, cleanliness and condition. Wheat failing to meet the specifications for any one of these grades is designated "sample grade." An extensive campaign to eradicate the common barberry, on which the spring stage of black stem rust of wheat occurs, was begun in 1918, and several million bushels of this plant were located and destroyed in the wheat-growing States of the northern Mississippi Valley. Consult *United States Department of Agriculture Year Book*, 1921. See AGRICULTURE.

WHEATON COLLEGE. A college for women at Norton, Mass., founded as a seminary in 1834, and chartered as a college in 1912. Between that year and 1924 the number of students entering for college work increased from 15 to 400. College courses replaced seminary courses; they were organized into departments and arranged in a group system; an entirely new faculty composed of 35 men and women was built up. The college had in 1924 about $1,000,000 in productive funds and $1,000,000 in buildings and equipment. During the decade 1914–24, the plant was enlarged by the construction of six brick buildings, including Science Hall, Cragin and Stanton Halls (dormitories), the chapel, the observatory, and the library; and by the purchase of two dwellings adjacent to the campus for faculty houses and three others for student dormitories. President, Samuel Valentine Cole, A.M., D.D., LL.D.

WHEAT RUST. See PLANTS, DISEASES OF.

WHEELER, BURTON KENDALL (1882–). An American public official, born at Hudson, Mass. He began his career as a stenographer in Boston, but later became a lawyer in Butte, Mont., and attracted much attention by his success in winning damage suits for the miners against the big copper companies. The liberal political element in Montana sent him to the State Senate, and he was appointed Federal District Attorney in Montana in 1913. During the War, Wheeler was accused of being too lenient with the miners and their leaders, and in 1918 President Wilson refused to reappoint him as District Attorney. In 1920 he was nominated for the governorship of Montana but was defeated. In 1922 he was elected to the United States Senate by a large majority. While in charge of the investigation of former Attorney General Daugherty, he was indicted in Montana on a charge of accepting a fee illegally. Although he was exonerated by a special Senate committee, the indictment remained against him. In 1924 he was nominated for the

office of Vice President of the United States on La Follette's progressive ticket.

WHIPPLE, GUY MONTROSE (1876–). An American psychologist, born at Danvers, Mass., and educated at Brown and Cornell Universities. He began teaching in 1902 at Cornell and went to the University of Illinois in 1914. The Carnegie Institute of Technology employed him from 1917 to 1919 as acting director of its bureau of salesmanship and as professor of applied psychology. In 1919 he became professor of experimental education in the University of Michigan. During the War he was a member of the committee on mental examination of army recruits. His writings include: *Questions in School Hygiene* (1909); *Manual of Mental and Physical Tests*, 2d ed. (1914); *How to Study Effectively* (1916); *Classes for Gifted Children* (1919).

WHITAKER, MILTON C. (1870–). An American chemist, born in Frazeysburg, Ohio, and educated at the University of Colorado. In 1903 he became chemist and general superintendent of the Welsbach Company but resigned in 1911 to accept the professorship of chemical engineering at Columbia University. This chair he held until 1917, when he was made vice president of the United States Industrial Alcohol Company and president of the United States Industrial Chemical Company. In 1923 he received the Perkin medal of the American section of the Society of Chemical Industry for his original work on the chemistry and production of alcohol and its derivatives. In 1911–16 he was editor of the *Journal of Industrial and Engineering Chemistry*.

WHITE, JAMES (1863–). A Canadian geographer (see VOL. XXIII). He was chairman of the Advisory Board on Wild Life Protection in 1917 and in the same year won the Alexandre Roquette prize. In 1921 he was employed in the Labrador boundary case and in 1922 became technical adviser to the Minister of Justice.

WHITE, JOHN ELLINGTON (1868–). An American Baptist clergyman and educator, born at Clayton, N. C., and educated at the Wake Forest College. Ordained to the Baptist ministry in 1892, he served as pastor in several churches in North and South Carolina. In 1916 he became president of Anderson College. He was the founder of a system of Baptist schools for the mountaineers and president of the Clifton Conference for negro schools. From 1914 to 1916 he was preacher and lecturer at the University of Chicago. He is the author of *The Silent Southerners* (1906); *The New Task and Opportunity of the South* (1908); *Southern Highlanders* (1913); and *A Yielded Pacifist* (1917).

WHITE, WILLIAM ALANSON (1868–). An American neurologist and alienist (see VOL. XXIII). Since 1914 Dr. White has produced several major works, beginning with the treatise on neurology written in collaboration with Jelliffe, *Diseases of the Nervous System* (1915). The ninth edition of his *Outlines of Psychiatry* appeared in 1923. The following monographs also came from his pen: *Mechanisms of Character Formation* (1916); *The Principles of Mental Hygiene* (1917); *The Mental Hygiene of Childhood* (1919); *Thoughts of a Psychologist on the War and After* (1919); *Foundations of Psychiatry* (1921), and *Insanity and the Criminal Law* (1923).

WHITE, WILLIAM ALLEN (1868–). An American journalist and author (see VOL. XXIII). During the War the American Red Cross sent him to Russia as an observer, and he was appointed a delegate to the Russian Conference at Prinkipo in 1919. His later publications include: *God's Puppets* (1916); *In the Heart of a Fool* (1918); *The Martial Adventures of Henry and Me* (1918); *The Editor and His People*, a collection of editorials (1924).

WHITEHEAD, ALFRED NORTH (1861–). A British mathematician and philosopher (see VOL. XXIII). After terminating his joint inquiry with Bertrand Russell into the foundations of mathematics and logic, he devoted himself to the elaboration of a philosophy of physical science. This philosophy, although conducted on realistic presuppositions, was free from the deterministic dogmatism characterizing so many realistic philosophies. In *The Principle of Relativity*, he presented what he regarded as an alternative rendering of the theory of relativity. He retained the metrical formula of Einstein's special theory but discarded the general theory and so reframed the equations as to maintain the traditional distinction between physics and geometry. His other works since 1914 include *Principles of Natural Knowledge* (1919) and *The Concept of Nature* (1920). In 1924 he was called to the faculty of Harvard University.

WHITEHEAD, JOHN BOSWELL (1872–). An American electrical engineer, born in Norfolk, Va., and educated at Johns Hopkins University. During 1893–96 he was an electrician with the Westinghouse Electric and Manufacturing Company, and during 1896–97 he was similarly associated with the Niagara Falls Power Company. In 1897 he returned to Johns Hopkins as instructor in applied electricity, and in 1910 he was advanced to a professorship. Since 1919 he has also been dean of the faculty of engineering there. His original researches have had to do with such subjects as magnetic effect of electric displacement, single-phase railway system, and submarine detection. During 1917–19 he was a major in the Engineers Corps. Besides many papers on engineering and physical topics, he wrote *Electric Operation of Steam Railways* (1909).

WHITEHOUSE, VIRA BOARMAN (MRS. NORMAN DE R. WHITEHOUSE) (1875–). An American publicist, born in Virginia, and educated at Newcomb College in New Orleans. In 1898 she married Norman de R. Whitehouse of New York City. From 1913 she was an active worker and speaker in behalf of woman suffrage and in 1916 was appointed chairman of the New York State Woman Suffrage party. Mrs. Whitehouse played an important part in securing woman suffrage for that State at the State election on Nov. 6, 1917. In 1918 she was sent to Europe by the United States government to organize publicity to combat German propaganda and to make plain the aim of the American people. In 1920 she became president of the Whitehouse Leather Products Company. She wrote *A Year as a Government Agent* (1920).

WHITE RUSSIAN SOCIALIST SOVIET REPUBLIC. See RUSSIA.

WHITE SLAVERY. See LEAGUE OF NATIONS.

WHITHORNE, EMERSON (1884–). An American composer, born at Cleveland, Ohio.

He studied there with J. Hartmann (piano and harmony) and J. Rogers (composition). From 1904 to 1906 he continued his studies in Vienna under Leschetizky (piano) and R. Fuchs (composition) and spent the following year in Berlin with Artur Schnabel (piano). In 1907–14 he lived in London as a teacher and writer on musical subjects and served as critic of the *Pall Mall Gazette* (1913–14). In 1915 he settled in St. Louis as editor for the Art Publication Society. In 1907 he married the pianist Ethel Leginska, but separated from her in 1909. His works include the symphonic poems, *Ranga, The City of Ys,* and *In the Court of the Pomegranates;* the orchestral suites, *Japanese, Adventures of a Samurai,* and *New York Days and Nights* (also arranged for piano); several minor works for orchestra; three string quartets; a song cycle for vocal quartet, *Songs of Sappho;* piano pieces, and songs. He is the author of *Instruments of the Modern Symphony Orchestra* (1921).

WHITLEY REPORT. See GREAT BRITAIN, *History.*

WHITLOCK, BRAND (1869–). An American author and diplomat (see VOL. XXIII). As United States Minister to Belgium during the War he opposed German aggression with great boldness and considerable success and on many occasions saved the Belgians from the effects of drastic edicts. In 1918 he wrote *Memories of Belgium Under the German Occupation.* He published *J. Hardin and Son,* a novel, in 1923.

WHITMAN COLLEGE. An institution founded in 1859 at Walla Walla, Wash. The student enrollment doubled in the 10 years between 1914 and 1924, increasing from 250 to 504; the faculty grew from 28 to 40 members, and the library from 25,000 volumes to 34,500 bound volumes and 50,000 pamphlets. The endowment increased from $663,493 to $882,924 and the annual income from $70,504 to $170,150. A major examination system, instituted during the period, required that a student must, before receiving his degree, pass an oral examination before a committee of the faculty on the entire work done in his major subject over three or four years of study. The honor system was also adopted for examinations and tests, and a chapter of Phi Beta Kappa was established. A campaign for $1,500,000 for buildings was inaugurated early in 1924, to be completed in June of that year. President, Stephen B. L. Penrose, D.D., LL.D.

WHITNEY, GERTRUDE VANDERBILT (?–). An American sculptress. During the War she founded a hospital in France and labored unremittingly among the soldiers. Her war sculptures are unique in their quality of distinctly feminine sympathy and tenderness for the young soldiers. Among the best of them are "Found," "Engineers," and "Not Yet Discharged." These are all figures and groups of young American soldiers.

WICKERSHAM, GEORGE WOODWARD (1858–). An American lawyer and public official (see VOL. XXIII). In 1915 he was delegate-at-large and chairman of the judiciary committee of the New York Constitutional Convention. From 1914 to 1917 he was president of the Association of the Bar of the City of New York. He was a member and later vice chairman of the District Board of the City of New York under the United States Selective Service Law in 1917–18. In 1920 he was president of the American Prison Association and chairman of the executive committee of the New York Prison Association.

WIDAL, (GEORGES) FERNAND ISIDORE (1862–). A French bacteriologist (see VOL. XXIII). In the decade since 1914 he added to the laurels which he had won in serodiagnosis and in the salt-poor diet for renal dropsy, by innovations in the prognosis of chronic kidney disease by determining the amount of residual blood nitrogen. In collaboration with Roger and Teissier he produced *Nouveau Traité de Médicine* (1920), and with Teissier and others, *Rhumatismes* (1924).

WIDDEMER, MARGARET (MRS. ROBERT HAVEN SCHAUFFLER) (?–). An American author, born at Doylestown, Pa., and graduated from the Drexel Institute Library School in 1909. She wrote poems when a child. A child-labor poem entitled *The Factories,* her first published work, attracted wide attention. Among her writings are: *The Rose-Garden Husband* (1915); *Winona of the Camp Fire* (1915); *Why Not?* (1915); *The Wishing-Ring Man* (1917); *Winona's War Farm* (1918). *The Old Road to Paradise* (1918), which gained her a share of the Pulitzer prize for the best book of poems, in the year 1919; *Graven Image* (1923).

WIEGAND, KARL MCKAY (1873–). An American botanist, born at Truxton, N. Y., and educated at Cornell University. He was assistant and instructor in botany at Cornell until 1907, and from then to 1913 he was associate professor of botany at Wellesley College. From the latter year he was professor of botany and head of the department at the New York State College of Agriculture at Cornell University. Professor Wiegand was the author of over 80 papers on botanical subjects.

WIESBADEN AGREEMENT. See REPARATIONS.

WIGGIN, KATE DOUGLAS (MRS. GEORGE C RIGGS) (1859–1923). An American author (see VOL. XXIII), who died in London in 1923. Among her later stories were: *Bluebeard,* a musical fantasy (1914); *Penelope's Postscripts* (1916); *Ladies in Waiting* (1918); and *Homespun Tales* (1920). Her reminiscences were published posthumously as *My Garden of Memories* (1924).

WILAMOWITZ-MÖLLENDORF, ULRICH VON (1848–). A German philologist (see VOL. XXIII). He translated and edited many Greek classics. His most recent works are *Antike Metrik* (1922) and *Pindar* (1923).

WILBUR, CURTIS DWIGHT (1867–). An American lawyer and public official, born at Boonesville, Iowa. He was graduated at the United States Naval Academy in 1888, resigned from the navy in the same year, and in 1890 began the practice of law in Los Angeles. He was judge of the Superior Court of Los Angeles County from 1903 to 1918 and became justice of the Supreme Court of California in 1919. He organized the Juvenile Court of Los Angeles and drew up several of the juvenile court laws of California. On the resignation of Edwin Denby, Judge Wilbur was appointed Secretary of the Navy by President Coolidge and took office on Mar. 25, 1924.

WILBUR, RAY LYMAN (1875–). An American physician and president of Stanford University (see VOL. XXIII). In 1917 he was

chief of the conservation division of the United States Food Administration and a member of the California State Council of Defense. In 1918 he was a regional director of the Students' Army Training Corps and in 1919 president of the California State Conference of Social Agencies.

WILCZYNSKI, Ernest Julius (1876–). An American mathematician, born in Hamburg in Germany, and educated at the University of Berlin. Coming to the United States in 1897, he became a computer in the office of the United States Nautical Almanac in 1898. In 1898 he was appointed instructor in mathematics at the University of California, where he remained until 1907 and became associate professor in 1906 He then transferred his allegiance to the University of Illinois but resigned in 1910 to accept the chair of mathematics at the University of Chicago, where he has since remained. He is the author of *Projective Differential Geometry of Curves and Ruled Surfaces* (1906); *The New Haven Colloquium*, with E. H. Moore and M. Mason (1910); *Plane Trigonometry and Applications* (1913), and *College Algebra with Applications* (1916).

WILDER, Harris Hawthorne (1864–). An American zoölogist, born at Bangor, Me., and educated at Amherst College and at Freiburg. He taught at the Jefferson High School in Chicago (1886–89), and at the Lake View High School (1891–92) and later became professor of zoölogy (1892–) at Smith College. His most important researches were on the embryology and anatomy of vertebrates, the epidermic markings of the palms and soles of the primates, and the teratology of vertebrates. He published *Invertebrate Zoology* (1894); *History of the Human Body* (1910); *Personal Identification* (1902); and *Manual of Anthropometry* (1920).

WILDMAN, Edwin (1867–). An American editor and author, born at Corning, N. Y., and educated at the General Wesleyan Seminary, Phillips Exeter Academy, and Harvard University. For several years he was editor and proprietor of newspapers in Georgia and New York and was a writer and war correspondent for *Leslie's Weekly* (1897–98). He served as special war correspondent in the Philippines from 1898 to 1900 and was special commissioner with the allied troops in the war in China (1900–01). From 1918 to 1920 he was president and editor of *The Forum* He wrote *Writing to Sell* (1915) · *America's Attitude toward the War* (1917); *American Leaders of Industry* (1919, 1921).

WILES, Irving Ramsey (1861–). An American portrait painter (see Vol. XXIII). His recent portraits, particularly those of women, continue his able, academic manner. In 1919 he received the Maynard Portrait Prize from the National Academy of Design, New York City, and the Lippincott Prize from the Pennsylvania Academy, Philadelphia.

WILEY, Hugh (1884–). An American writer, born at Zanesville, Ohio, and educated in the public schools. From 1902 to 1917 he was an engineer and contractor During the War he served in the Engineers Corps as a captain. Besides contributing many short stories to magazines, he wrote *The Wildcat* (1920); *Jade* (1921); and *Lady Luck* (1921).

WILLARD, Daniel (1861–). An American railway president, born at North Hartland, Vt., and educated at the Massachusetts Agricultural College. He entered the railway service in 1879 and became assistant general manager of the Baltimore and Ohio Railroad in 1899 and its president on Jan. 15, 1910. In 1917 he became chairman of the Advisory Commission of the Council of National Defense and in the next year was made chairman of the War Industries Board. He was commanding colonel of engineers in the United States Army in 1918.

WILLCOX, William Russell (1863–). An American lawyer (see Vol. XXIII). From 1916 to 1920 he was chairman of the Republican national committee. In 1918 he was appointed a member of the Railway Wage Commission.

WILLEBRANDT, Mabel Walker (1889–). An American lawyer, born at Woodsdale, Kan. She graduated from the Tempe Normal School in 1911 and from the law department of the University of Southern California in 1916 After teaching law for several years she was admitted to the bar and practiced in Los Angeles. She acted as public defender of women and was attorney in some 2000 cases. In 1902 she was appointed Assistant Attorney General of the United States, the first woman to fill that office. She was placed in charge of prohibition law enforcement.

WILLETT, Herbert Lockwood (1864–). An American theologian, born at Ionia, Mich., and educated at Bethany College, W. Va., and Yale, Chicago, Berlin Universities. In 1890 he was ordained to the ministry of the Christian Church and for several years was a pastor at Dayton, Ohio. He became associate professor (1896) and later professor of Semitic languages and literature at the University of Chicago The latter post he held from 1915. From 1908 to 1920 he was minister of the Memorial Church of Christ of Chicago. He was well-known as a lecturer and wrote: *Life and Teachings of Jesus* (1898); *Prophets of Israel* (1899); *The Moral Leaders of Israel* (1916); and *Our Bible—Its Origin, Character, and Value* (1917). From 1916 to 1920 he was president of the Chicago Church Federation, and in the latter year became Chicago representative of the Federal Council of Churches of Christ in America.

WILLIAM (Friedrich Wilhelm Victor August) (1882–). Ex-Crown Prince of Prussia and Germany (see Vol. XXIII). At the outbreak of the War he was put in command of the 5th Army on the west which won the battles of Longwy and Longuyon on Aug. 22 and 24, 1914. Later he was nominally in charge of the unsuccessful operations against Verdun. In November, 1918, he followed his father to Holland and took refuge on the island of Wieringen in the Zuyder Zee. On Dec. 1, 1918, he formally renounced his rights of succession to the crowns of Prussia and the German Empire

WILLIAM II (Friedrich Wilhelm Victor Albert) (1859–). Ex-Emperor of Germany and ex-King of Prussia (see Vol. XXIII). At the opening of the War, although professing a desire for peace, he insisted on impossible conditions: Austria must be allowed to deal with Serbia alone, England must observe neutrality, etc. At the opening session of the last Reichstag of his reign, when his armies were already devastating Belgium, his speech breathed fire and slaughter against his enemies, and at its conclusion he shook hands with

each deputy and announced: "Now we will give them a good thrashing." The High Command, however, kept him away from the front, and his part in the War consisted of occasional inflammatory speeches to troops and such utterances as that in which he urged the complete annihilation of Great Britain's "contemptible little army." He was never under fire, unless accidentally from airplanes, and his influence with his people constantly diminished until, at the time of Germany's collapse, the nation broke out in a revolution which had as one of its objects his abdication and the abjuring of his dynasty. Under pressure of his entourage, complying with this demand, he said on Nov. 10, 1918: "To facilitate peace for the nation I will go to Holland." With a few companions in motor cars he fled across the border and took up his residence first at the castle of Amerongen, where he was the guest of Count Godard Bentinck, and afterward at Doorn Castle (June, 1920), which the ex-Kaiser purchased. Here he saw few visitors and occupied himself with sawing wood and writing his memoirs. Here his wife died, after a lingering illness, and in 1922 he married Princess Herminie.

WILLIAM AND MARY, COLLEGE OF. A coeducational State institution at Williamsburg, Va., founded in 1693. The enrollment of students increased 248 per cent, from 242 in 1916 to 845 in the year 1923–24 and 697 in the summer of 1923. The faculty likewise increased from 21 to 46 members and the library from 15,000 to 35,000 volumes. In 1918 women were admitted to the college for the first time, and a dormitory was built for them in 1921. Construction was begun in 1923–24 on a new men's dormitory also, to cost about $200,000, and a gift was received by the college of a $160,000 gymnasium. Courses in commerce, accounting, and other business subjects were offered in 1919. J. A. C. Chandler, LL.D., succeeded Lyon G. Tyler as president in 1919.

WILLIAM JEWELL COLLEGE. A college for men at Liberty, Mo., founded in 1849. The student enrollment increased from 224 in 1914 to 403 in 1923–24, the faculty from 14 to 16, and the number of bound volumes in the library from 24,000 to 30,000. The endowment in 1914 was $258,000, as compared with $700,000 in December, 1923, plus $400,000 additional that was due to be paid in 1924; and the income in the former year was $50,000, as compared with $85,000 in the latter. President, Harry Clifford Wayman, A.M., Th.D., D.Litt., D.D.

WILLIAMS, A. J. (?–). An American naval lieutenant who made three world records. They were for the fastest aërial speeds: 266.59 miles an hour, for 3 kilometers; 243.81 miles an hour, for 100 kilometers; and 243.67 miles an hour, for 200 kilometers. The last two were made in the Pulitzer race at St. Louis, Oct. 6, 1923.

WILLIAMS, CHARLES TURNER (1874–). An American banker and Red Cross official, born at Warrenton, N. C., and educated in the public schools. He began as a stenographer, then became a newspaper reporter, and in 1904 entered the private banking business in Richmond, Va. In 1917 he was appointed captain in the Red Cross Mission to Rumania and crossed Siberia into Russia, thence to Archangel, and carried the first supplies from the United States south to Rumania. In 1918 he was promoted major. In order to take supplies to Archangel, he traveled 1500 miles by sled, mostly within the Arctic Circle. He assisted in the Liberty Loan campaigns and other war activities.

WILLIAMS, RALPH VAUGHAN (1872–). An English composer, born at Down Ampney in Wiltshire. He received his musical education at the Royal College of Music under H. Sharpe and G. Moore (piano), W. Parratt (organ), and Hubert Parry and Charles Villiers Stanford (composition). In 1897–98 he was in Berlin with Max Bruch, and later, developing a strong leaning toward impressionism, he spent some time with Ravel in Paris. With the exception of a short period as organist at South Lambeth Church (1896–99) and extension lecturer at Oxford University, he held no official positions but devoted his entire time to composition. He wrote for orchestra *A London Symphony, Pastoral Symphony, The Solent, Bucolic Suite, Heroic Elegy,* three *Norfolk Rhapsodies, Harnham Down,* and *Boldrewood,* a *Fantasia* for piano and orchestra; the choral works with orchestra, *Toward the Unknown Region, Willow-wood, A Sea Symphony, The Garden of Proserpine, Five Mystical Songs;* incidental music to Aristophanes's *The Wasps* and Ben Jonson's *Pan's Anniversary;* a Mass in G minor; two piano quintets; two string quartets; many part-songs; and songs.

WILLIAMS, SIDNEY CLARK (1878–) An American editor, born at Wells, Me., and educated in the public schools and privately. For several years he was on the staff of papers in Maine and in Boston. From 1912 to 1914 he was literary editor and dramatic critic of the *Boston Daily Advertiser,* and from 1914 to 1919 literary editor of the *Boston Herald.* In 1920 he occupied the same post on the *Philadelphia North American.* He wrote *A Reluctant Adam* (1915); *The Eastern Window* (1918); and *The Body in the Blue Room* (1922).

WILLIAMS COLLEGE. A nonsectarian institution for men at Williamstown, Mass., founded in 1793. The student enrollment increased from 499 in 1914 to 694 in 1923-24, the faculty was increased in the same decade from 59 to 65 members, the library from 78,000 to 115,000 volumes, and the productive funds from $1,842,243 to $4,069,415. The Institute of Politics, which holds its meetings during the summer, was authorized by vote of the trustees of the college in 1913, but the members of the board of advisers were not chosen until 1919, and the first session was held in 1921. See POLITICS, INSTITUTE OF. During the War the president, Harry A. Garfield, LL.D., was made fuel administrator of the United States.

WILLIS, HUGH EVANDER (1875–). An American lawyer and educator, born at Stratton, Vt., and educated at Yankton (S. D.) College and the law department of the University of Minnesota. He was instructor, assistant professor, and professor of law at the University of Minnesota from 1902 to 1913, and from that year to 1915 dean and professor of law at the Northwestern University Law School. In 1917 he became professor of law and in 1920 dean of the law school of the University of North Dakota. He wrote several books on legal subjects, including *Law of Social Justice* (1918).

WILLOUGHBY, WILLIAM FRANKLIN (1867–). An American economist, born in Alexandria, Va., and educated at Johns Hopkins University. During 1901 he lectured on economics at Johns Hopkins and Harvard Uni-

versities, and during 1901–07 he was treasurer of Porto Rico. He was president of the executive council of the Porto Rico Legislative Assembly during 1907–09, when he was appointed assistant director of the United States Census. Two years later he became a member of the President's Commission on Economy and Efficiency. He was called to the chair of jurisprudence and politics at Princeton University in 1911 but resigned in 1916 to become director of the Institute for Government Research. In addition to many reports and special articles he is the author of *Workingmen's Insurance* (1898), *Territories and Dependencies of the United States* (1905), *The Problem of a National Budget* (1918), *The Government of Modern States* (1919), and *Government Organization in War Time and After* (1919).

WILLS, ALBERT POTTER (1873–). An American physicist, born in Waltham, Mass., and educated at Tufts College and Clark University, as well as in Göttingen and Berlin. During 1899–1902 he was an associate in applied mathematics and physics at Bryn Mawr College, after which, during 1902–03, he was physicist at the Cooper Hewitt Laboratory in New York City. He then became instructor in mechanics at Columbia University, where since 1909 he has been professor of mathematical physics. His original investigations have included studies on magnetic permeability, magnetic shielding, magneto-striction, magnetic properties of gases, hydrodynamic analogy to electric and magnetic fields, and other subjects related to magnetism.

WILLSIE, MRS. HONORÉ (?–). An American editor and writer, born at Ottumwa, Iowa, and educated at the University of Wisconsin. She was editor of *The Delineator* in New York City from 1914 to 1919. Her novels portray western life. *Heart of the Desert* (1913) was her first published novel, and won immediate recognition. Others were: *Still Jim* (1915); *Lydia of the Pines* (1916); *Benefits Forgot* (1917); *The Forbidden Trail* (1919); *The Enchanted Canyon* (1921); and *Judith of the Godless Valley* (1922).

WILMINGTON. The largest city of Delaware. Its population increased from 87,411 in 1910 to 110,168 in 1920, and to 119,828 in 1924 by estimate of the Bureau of the Census. In 1921–22 a deep-water terminal costing $3,410,000 was built on the Delaware and Christiana Rivers. It was fully equipped with loading and unloading facilities, railroad sidings, transit and storage sheds, and other facilities for both coastwise and foreign shipping. The value of Wilmington's manufactured products increased from $39,358,000 in 1914 to approximately $100,000,000 in 1923; her building activities rose from $1,731,129 in 1914 to $3,876,950 in 1924; and her bank clearings increased from $91,997,925 in 1914 to $140,527,235 in 1924. A new public library was built in 1923 costing approximately $535,224. As a memorial of the veterans of the War, a reinforced concrete bridge was opened in 1923 over Brandywine Creek. It was 720 feet long and 72 feet wide and was supported by three arches, the longest of which had a span of 250 feet.

WILSON, CHARLES STETSON (1875–). An American diplomat, born at Bangor, Maine. He began his diplomatic career as secretary of legation to Greece, Rumania, and Serbia in 1901. After serving in the legations in many capitals, among them Buenos Aires, Rome, and Havana, he was secretary of the embassy at Madrid (1916–18), and later counselor there and chargé d'affaires at Sofia in Bulgaria (1918–21). He was named Envoy Extraordinary and Minister Plenipotentiary to Sofia in October, 1921.

WILSON, EDWIN BIDWELL (1879–). An American mathematician, born in Hartford, Conn., and educated at Harvard, and Yale Universities, and in Paris. He became instructor in mathematics at Yale in 1900 and assistant professor in 1906; a year later he accepted a call to the Massachusetts Institute of Technology, where he was professor of mathematical physics and head of the department of physics in 1917–22. Since 1922 he has been professor of vital statistics at the Harvard School of Public Health. His original investigations include studies of vector analysis, multiple algebra, geometry, mechanics, and relativity. His publications include *Gibbs Vector Analysis* (1910), *Advanced Calculus* (1912), and *Aëronautics*, Lowell lectures (1920).

WILSON, SIR HENRY HUGHES (1864–1922). A British field marshal, born in Ireland. He joined the army in 1884 and served in Burma and South Africa. Promoted to the rank of colonel in 1904, he later became commandant of the staff college. In 1910 he was appointed director of military operations and in 1914 deputy chief of the general staff and liaison officer between the French and British forces. He commanded the 4th Army Corps in 1915 and in 1917 went to Russia at the head of a military mission. At Versailles he served as British military representative on the new Supreme War Council In February, 1918, he became chief of the Imperial General Staff. He became a general and finally a field marshal, but in December, 1921, he resigned from the War Office and was elected a member of the Northern Irish Parliament in Ulster.

WILSON, (THOMAS) WOODROW (1856–1924). The twenty-eighth President of the United States (see VOL. XXIII). The first two years of President Wilson's administration were marked by noteworthy achievements; the reduction of the tariff, the establishment of the Federal Reserve Bank System (1913), the Clayton Antitrust Act and the Federal Trade Commission (1914), were in large part due to his personal leadership of the Democratic party. The "new freedom" of domestic policy was marked by the keynotes of democracy and justice in foreign affairs. He withdrew from the Chinese financial consortium, deprecated economic imperialism and territorial aggrandizement in Latin America, tried to make amends to Colombia for the Panama Canal seizure, and pursued his course of "watchful waiting" with respect to Mexico, intervening only reluctantly when popular opinion demanded bold action to satisfy the outraged national honor. The outbreak of the War elicited from him an appeal to his fellow-countrymen to "be impartial in thought as well as in action." From the beginning, he believed it would be the mission of the United States to step forward, at the proper moment, as disinterested peace-maker. At times this hope was imperilled; the *Lusitania* and *Sussex* notes brought the United States to the verge of a break with Germany. But he could go to the country, in the election of 1916, on the issue that "he kept us out of war," and his re-election in November, 1916, by a popular plural-

ity of nearly 600,000, seemed to express the nation's approval of his course.

The events of 1917 clearly indicated that the lot of the United States could not remain that of a disinterested spectator. Germany's announced policy of unrestricted submarine warfare, the failure of her leaders to realize that President Wilson's severance of diplomatic relations threatened war, the continuance of submarine outrages, compelled him to ask Congress on Apr. 2, 1917, for a war declaration. Only then did he give full utterance to his belief that German autocracy must be crushed and the world "made safe for democracy." The War was prosecuted to the fullest extent of American resources. The United States under President Wilson gained a material leadership first and then a spiritual one. Wilson's historic "Fourteen Points" speech of Jan. 8, 1918, and his address of Sept. 27, 1918, promising justice even to "those to whom we do not wish to be just," won him so commanding a position as spokesman of the Allies that to him Germany's peace overtures were directed. The calling of the Peace Conference found him ready to attend in person, and the extraordinary enthusiasm with which the peoples of Europe greeted him, as the prophet of justice and the hope of the world, convinced him of the wisdom of his decision. The story of his courageous fight for a just peace and a League of Nations, of his departure for the United States in February, 1919, with the draft of the covenant, of his return to Paris in March, his conflicts with the Italians regarding Fiume, with the French concerning the Rhine, and the Japanese regarding Shantung, and his voyage home at the end of June with the completed Peace Treaty, is told in the article PEACE CONFERENCE AND TREATIES. The making of the peace had estranged him from Colonel House and Secretary Lansing; the opposition of the Republican Senate to the Treaty strengthened his resolve to make plain to the country the nature of his achievement. On Sept. 3, 1919, he began his coast-to-coast tour, but the great strain placed on him compelled him to retire to Washington, a very sick man. The disappointment of the rejection of the Treaty by the Senate in March, 1920, was tempered for him somewhat by knowledge of the instrument's ratification by the European powers and the establishment of the League itself in January, 1920. The last blow showed him how unsympathetic public opinion was: the presidential elections of November, 1920, to which he had looked for a "solemn referendum" on the League, gave an overwhelming majority to the Republican candidate, Warren G. Harding, who opposed the League.

On Mar. 4, 1921, he retired to private life and continued his residence in Washington. He lived to see the League of Nations firmly established, and he continued to deplore America's "sullen and selfish isolation" (speech of Nov. 11, 1923). He died on Feb. 3, 1924. He was survived by three daughters, Miss Margaret Wilson, Mrs. Francis B. Sayre, and Mrs. William G. McAdoo, children of his first marriage, and by his second wife, the former Mrs. Edith Bolling Galt, whom he had married on Dec. 18, 1915. See WAR, DIPLOMACY OF THE; UNITED STATES, *History*.

WILSON DAM. See DAMS.

WINDS. See METEOROLOGY.

WINDWARD ISLANDS. A group of islands in the British West Indies, consisting of Grenada, St. Vincent, the Grenadines (half under St. Vincent and half under Grenada), and St. Lucia. These constitute three separate colonies but are administered by a single governor Total area, 524 square miles; total population in 1911, 157,264; in 1921, 170,581. The leading products were cocoa, lime juice, sugar, rum, cotton. Commercial and financial statistics for 1921 follow (1913 figures in parentheses): imports, £620,761 (£694,219); exports, £611,107 (£756,809); revenue, £225 914 (£193,121); expenditure, £296,118 (£192,353); public debt, £391,350.

WINTER, GEORG (1856–). A German gynecologist and obstetrician, distinguished for his efforts in the prevention of cancer and the falling birth rate. Born in Rostock, he received his medical education at the University of Heidelberg, and in 1897 was made professor of obstetrics and diseases of women in the University of Königsberg and director of the female clinic. In 1896, in collaboration with Rüge, he published his important work, *Lehrbuch der Gynakologische Diagnostik*, which was translated into Russian and English. His small work, *Die Bekampfung des Uteruskrebs*, appeared in 1904. His prolonged study of the subject of falling birth rates led to the publication of two companion books, *Die Indikationen zur Kunstlichen Unterbrechung der Schwangerschaft* (1918) and *Die Indikationen zur Kunstlichen Sterilisation der Frau* (1920). In 1922 a *Festschrift* volume was published.

WINTER GRIPPE. See INFLUENZA.

WIRELESS TELEGRAPHY. See RADIO TELEGRAPHY.

WIRELESS TELEPHONY. See RADIO TELEPHONY.

WIRTH, KARL JOSEPH (1879–). A German statesman, born in Baden, and educated at the University of Freiburg. He became a teacher of economics at the Technical College in Freiburg in 1908. As a member of the Catholic Centre party he sat in the Diet of Baden in 1913 and was appointed Minister of Finance in 1918. He was elected to the Constituent Assembly by the Reich at Weimar in 1919 and received the portfolio of finance in March, 1920. When the ultimatum on reparations was presented by the Allies in May, 1921, Dr. Wirth was asked to form a new cabinet. He secured the coöperation of Democrats, Catholics, and Socialists. The new ministry then accepted the Allies' reparation terms, and by Aug. 31, 1921, the first half-yearly instalment had been paid. Dr. Wirth stood his ground solidly against various attempts to overturn the German Republic but it did not conceal his fear that the partition of Upper Silesia would render it impossible for Germany to fulfill her obligations.

WISCONSIN. Wisconsin is the twenty-fifth State in size (56,066 square miles), and the thirteenth in population; capital, Madison. The population was 2,333,860 in 1910 and 2,632,067 in 1920, an increase of 12.8 per cent. The white population increased from 2,320,555 to 2,616,938; negro, from 2900 to 5201; native white, from 1,807,986 to 2,156,810. The foreign-born white population, on the other hand, decreased from 512,569 to 460,128. Both urban and rural populations mounted, the former from 1,004,320 to 1,244,568; the latter from 1,329,540 to 1,387,499. The growth of the principal cities was as follows: Milwaukee (q.v.), 1910, 373,-



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WOODROW WILSON

857, 1920, 457,147; Racine, 38,002 to 58,593; Kenosha, 21,371 to 40,472. Superior's population in 1910 was 40,384; in 1920, 39,671 (a decrease).

Agriculture. As Wisconsin is one of the important grain-growing States, agricultural conditions in the decade 1910–20 were affected largely by the fluctuations in price and production of grain products during the war and post-war periods. This general situation is discussed fully in the article AGRICULTURE and in the articles on various grains, WHEAT, CORN, and others. While the population of the State increased 12.8 per cent in the decade, the number of farms increased 6.9 per cent (from 177,127 in 1910 to 189,295 in 1920); the total area of land in farms increased 5.2 per cent (from 21,060,066 to 22,148,223 acres); the improved land in farms, 4.6 per cent (from 11,907,606 acres to 12,452,216). The percentage of the total area in farms increased from 59.6 per cent in 1910 to 62.6 in 1920; the proportion of improved land to the total area from 33.7 to 35.2. The total value of farm property showed an apparent increase of 89.5 per cent, from $1,413,118,785 to $2,677,282,997, the average value per farm, from $7978 to $14,143. In interpreting these values, however, and, indeed, all comparative values in the decade 1914–24, the inflation of the currency in the latter part of that period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 189,295 farms in 1920, 159,610 were operated by owners, 2427 by managers, and 27,258 by tenants. The comparative figures for 1910 were 151,022, 1451, and 24,654. White farmers in 1920 numbered 188,632; colored farmers, 663. In 1910 white farmers numbered 176,536, colored, 591. The number of farms free from mortgage in 1920 was 57,773; under mortgage, 94,258. In 1910 farms free from mortgage numbered 72,941; mortgaged, 77,129. The total number of cattle in 1920 was 3,050,829 (2,763,483 dairy cattle); in 1910, 2,680,074 (dairy cattle, 1,473,505). This reflects the large growth of the dairy industry, which has made Wisconsin the leading dairy State. Sheep in 1920 numbered 479,991, compared with 929,783 in 1910; hogs, 1,596,419, compared with 1,809,331. The estimated production of the principal farm crops in 1923 was as follows: corn, 90,326,000 bushels; spring wheat, 928,000; winter wheat, 1,122,000; oats, 93,574,000; barley, 13,484,000; rye, 5,062,000; potatoes, 27,287,000; hay, 3,926,000 tons; tobacco, 48,092,000 pounds; and sugar beets, 129,000 short tons. Comparative figures for 1913 are: corn, 66,825,000 bushels; wheat, 3,665,000; oats, 83,038,000; barley, 18,125,000; rye, 7,438,000; potatoes, 32,155,000; hay, 3,848,000 tons; and tobacco, 50,740,000 pounds.

Mining. Wisconsin is not among the States most important in mineral production. Its chief minerals in the order of their value are stone, sand and gravel, mineral waters, and lime. Iron ore also is produced. The iron shipped from mines in 1914 was 591,595 long tons, valued at $1,178,610; 1916, 1,529,459, $3,644,542; 1918, 1,167,640, $3,796,408; 1920, 1,067,159, $4,333,307; 1921, 117,755, $300,954; and 1922, 794,673, $2,455,660. The value of clay products is about $1,000,000 annually. The total value of the mineral production in 1921 was $9,990,961, compared with $19,630,114 in 1920; $18,772,601 in 1919; $20,091,146 in 1918; and $11,140,365 in 1914.

Manufactures. Wisconsin is an important industrial State and its development was steady after 1909. In 1920 it had 21 cities with more than 10,000 inhabitants. These contained 36.6 per cent of the total population and in 1919 reported 63.9 per cent of the State's manufactured products. There were in the State, in 1909, 9721 manufacturing establishments; 1914, 9104; and 1919, 10,393. Persons engaged in manufacture numbered 213,426, 230,273, and 317,899; and the capital invested amounted to $605,657,324, $754,287,116, and $1,361,729,196, in those years. The value of products in 1909 was $590,305,538; 1914, $695,172,002; and 1919, $1,846,984,307. The large increase in value of products from 1914 to 1919 was, however, in great measure due to changes in industrial conditions brought about by the War and cannot properly be used to measure the expansion of manufactures during the period; but the increase in the average number of persons employed and in the number of establishments clearly indicates a decided growth in the manufacturing activities of the State. The principal industry in point of value of products is the manufacture of automobiles and parts. The value of these, in 1909, was $11,440,000; 1914, $18,478,000; and 1919, $119 381,000. Slaughtering and meat packing ranks second in value, with $27,217,000 in 1909; $34,698,000 in 1914; and $106,207,000 in 1919. The leather industries, third in this respect, in 1909 had a product valued at $44,668,000; 1914, $42,204,000; and 1919, $94,762,000. The chief manufacturing cities are Milwaukee, Racine, and Kenosha. There were in Milwaukee, in 1909, 1764 manufacturing establishments, with a product valued at $208,324,000; 1914, 1728 with $223,555,000; and 1919, 2093 with $576,161,000. Racine had, in 1909, 142 establishments, with a product valued at $24,673,000; 1914, 189 with $43,632,000; and 1919, 230 with $120,027,000. Similar figures for Kenosha are: in 1909, 62 with $23,182,000; 1914, 75 with $28,341,000; and 1919, 84 with $103,726,000. Other important manufacturing cities are Green Bay, Beloit, La Crosse, Sheboygan, Superior, and Appleton.

Education. Education in Wisconsin has always been maintained at a high degree of excellence, and great progress was made in the decade 1914–24. Special attention was given to improvement in the administration of elementary schools. Results are shown by the fact that while 49 out of every 100 pupils finished the eighth grade in 1914–16, 60 out of every 100 finished in 1918–20. This increase, indicating an upward trend in the holding power of the elementary school in the State, may be attributed in part to an awakened interest in education on the part of parents, to the enforcement of the compulsory education law, and to changes gradually taking place in the school organization. Special attention was also given during the period to the increased efficiency of the high schools. There are in the State four types of secondary schools, the State graded schools, four-year high schools, junior high schools, and senior high schools. The number of high schools in the State increased from 318 in 1913 to 407 in 1920. State supervision of the public high schools was in charge of five supervisors; the primary purpose of such supervision was to assist local school authorities

and teachers in the improvement of their schools. The junior high school law, enacted in 1919, provided for the establishment of such schools under the required conditions. The State graded schools, created by a legislative act in 1901, had been a feature of the Wisconsin educational system for 20 years. In 1921–22 there were 226 State graded schools of the first class, which means schools of three or more departments; and 352 graded schools of the second class, each of two departments. Every county contained at least one graded school. Vocational work had been carried on since 1913, when the Legislature gave high schools special financial aid to further the introduction and maintenance of certain so-called "vocational training courses," including courses in manual training, domestic science, agriculture, and commercial science; the system was being developed to a high degree of efficiency. The total enrollment in the schools in 1921–22 was 498,398; with 283,889 in the country schools and 214,509 in city schools. The enrollment in rural schools was 26,465 and in city high schools 46,698. The public school enrollment in 1923 was 506,071, compared with 440,103 in 1914. Total disbursements for educational purposes in 1921–22 were $23,182,162. The percentage of illiteracy in the State decreased from 4.2 in 1910 to 3.2 in 1920: in the native white population, from 0.9 to 0.6; in the foreign-born white, from 8.9 to 8.8; and in the negro, from 5.3 to 4.8.

Finance. For finance, see STATE FINANCES.

Political and Other Events. During the decade 1914–24, Senator La Follette remained the conspicuous Republican leader of the State. He was, however, opposed with success both by Governor Philipp, who was three times elected during the decade, and by Senator Lenroot, who was twice elected to the Senate. The formation by Senator La Follette of a new party in 1924 practically removed him from the Republican party in the State. In the elections held in 1914 for governor, other State officers, United States Senator, and Congressmen, the Republican candidate for governor, E. L. Philipp, was elected, while the Democrats elected their candidate, Paul O. Husting, as Senator. Senator La Follette was reëlected in 1916, and so was Governor Philipp, together with all the Republican State candidates for office. In the presidential voting of this year, Charles E. Hughes received 221,323 votes; President Wilson, 193,042. The stand taken by Senator La Follette on government war measures aroused bitter feeling in the State in 1917, and a movement was begun to have him expelled from the Senate. No action was taken. Senator Husting was accidently killed while hunting, in 1917, and in 1918 Irvine L. Lenroot was chosen to succeed him. Governor Philipp was reëlected in 1918. In 1920 the Republicans elected their candidate for governor, John J. Blaine. Irvine L. Lenroot was reëlected to the Senate. In the presidential voting of this year, W. G. Harding received 498,576 votes; J. M. Cox, 113,422. Governor Blaine was reëlected in 1922. Senator La Follette was also reëlected. The Democratic candidate for the Senate at this election was a woman, Mrs. Ben C. Hooper. The presidential primary elections were held in May, 1924. The Republican majority was given to Senator La Follette and the Democratic to Gov. Alfred E. Smith of New York.

Legislation. The eugenic marriage law passed by the Legislature in 1913 was upheld by the Supreme Court in 1914. The Legislature of 1915 defeated measures providing for the submission of a woman suffrage amendment to the people. In 1917 the laws relating to criminal procedure were amended, and provision was made for absentee voting. The banking and insurance laws of the State were also amended. Two sessions of the Legislature were held in 1919. A special session was called, chiefly for the purpose of passing the soldiers' bonus law. This provided for a payment of $10 a month for each month of service. The act was submitted to the people at a special election and was adopted. The labor laws were amended, and a State Board of Conciliation was created. The Legislature of 1921 provided for a juvenile department for the care of dependent, defective, and delinquent children. The school laws were also amended in other particulars, and equal rights were given to women in respect to suffrage, jury service, holding office, and the care and custody of children. In 1923 the Legislature made the sale of narcotics a felony and the possession of drugs illegally obtained a crime. The labor laws were amended by extending a measure limiting injunctions to labor disputes, to apply to any dispute whatsoever concerning employment.

WISCONSIN, UNIVERSITY OF. A coeducational State institution at Madison, Wis., founded in 1848. The student enrollment increased from 4874 in the fall of 1914 to 7632 in the fall of 1923, and from 2599 in the summer of 1914 to 4710 in 1923. In the same period the teaching faculty was increased from 694 to 878 and the library from 483,000 volumes to 667,000 bound volumes and 304,000 pamphlets. The income in 1914 was $2,758,118; in 1923, $5,905,608. A physics building was constructed in 1916, and the student infirmary and Bradley Memorial Hospital were built in 1920. In 1921 work was begun on the Wisconsin State Hospital, for which the Legislature appropriated $1,350,000. A new degree of Ph.B. was established in 1918, with stress on scientific and without foreign language requirements. In 1917–18 a standing university research committee was formed to coöperate with the National Research Council. Charles R. Van Hise, Ph.D., the president, died in 1918, and was succeeded in office by Edward A. Birge, Ph.D., Sc.D.

WISSLER, CLARK (1870–). An American anthropologist (see VOL. XXIII). His most recent works are: *Riding Gear of the North American Indian* (1914); *Costumes of the Plains Indians* (1914); *Harpoons and Darts of the Stefansson Collection* (1916); *General Discussion of the Shamanistic and Dancing Societies* (1916); *The Sun Dance of the Blackfoot Indian* (1917); *The American Indian* (1917); *Archæology of the Arctic Eskimo* (1918); *Indian Bead Work* (1919); *The American Indian: An Introduction to the Anthropology of the New World* (1922); *Man and Culture* (1923).

WODEHOUSE, PELHAM GRENVILLE (1881–). An American author, born at Guildford, England, and educated at Dulwich College. He began his career as a writer of a humorous column in the London *Glove*. He came to the United States in 1909. His publications include: *The Prince and Betty* (1911); *The Little Nugget* (1913); *Uneasy Money* (1916);

Piccadilly Jim (1917); *The Damsel in Distress* (1919); *Their Mutual Child* (1919); *The Little Warrior* (1920); *Indiscretions of Archie* (1921); *Three Men and a Maid* (1922); *Jeeves* (1923); *Leave it to Psmith* (1924). He has also written many musical comedy lyrics and has collaborated in several plays, among the best known being *Kissing Time, The Golden Moth* (1921), *The Cabaret Girl* (1922), and the Princess Theatre musical comedy series with Guy Bolton and Jerome Kern.

WOEVRE PLAINS. See WAR IN EUROPE, *Western Front.*

WOJIECHOWSKI, STANISLAS (1869–). A president of Poland. Exiled as a young man for protesting against Russian oppression, he went to Geneva, Paris, and London. When he returned to Poland in 1904, he definitely broke with international socialism and threw all his efforts into the coöperative movement. When the War began, he made a trip through Poland to urge a united stand against Germany. Driven from Warsaw by the Austro-German invasion, he helped form the Polish legion in France. In 1919 he returned to Poland and was made secretary of state under Paderewski. On Dec. 22, 1922, he was elected president of Poland.

WOLCOTT, JOSIAH OLIVER (1877–). An American jurist and legislator, born at Dover, Del., and educated at Wesleyan University. In 1904 he was admitted to the bar. He served successively as Deputy Attorney General of Newcastle County and as Attorney General of the State. In 1917 he was elected to the United States Senate but resigned in 1921 to accept the appointment of Chancellor of Delaware.

WOLFF, ALBERT (1884–). A French conductor and composer, born at Paris. In 1898 he entered the Conservatoire, where his teachers were Leroux, Vidal, and Gédalge. He began his career as organist at St. Thomas d'Aquin (1907–11). In 1911 he was appointed second conductor at the Opéra Comique and of the Concerts Rouges and in the following year also conducted the orchestra of the Cercle Internationale at Vichy. Until the outbreak of the War he appeared as guest conductor in several cities of France and in Buenos Aires. During the War he served in the French army. After the Armistice he returned to his post at the Opéra Comique. From 1919 to 1923 he was conductor of the French repertoire at the Metropolitan Opera House, from which he resigned because of the demands made on his time by his duties at the Opéra Comique, where, in 1920, he had been appointed Messager's successor as first conductor and general musical director. He wrote the operas *Le Marchand de Masques* (Nice, 1904), *l'Oiseau Bleu* (New York, 1919), and *Sœur Béatrice* (not produced); a ballet, *Kilidja;* a symphonic poem; and a violin sonata.

WOMAN'S RELIEF CORPS, NATIONAL. An auxiliary to the Grand Army of the Republic. During the War the Corps did efficient service. It was estimated that 150,000 members were affiliated with the American Red Cross in 1918. During that year 13 ambulances were purchased, equipped and sent to France, and 35 beds and all their furnishings were given to the United States government for use in reconstruction hospitals. It was voted at the national convention to raise a war work fund of not less than $50,000, to be used exclusively in war relief. This work still continues. During the year 1923–24 over $62,000 was spent in patriotic work and additional sums in war relief and for other purposes. In 1920 was inaugurated the ceremony at naturalization proceedings of pinning on the lapel of the coat of the newly created citizen a small American flag and of presenting him with a somewhat larger flag for his home. Committees on Americanization and child welfare and thrift were established in 1920–21. The convention of 1924 was held in Boston, Mass., and was attended by 593 delegates. The reports of the committees indicated active work throughout the year. The convention held in Boston in 1924 was the largest in the history of the Corps. In 1924 the Corps included 36 departments and 3 provisional departments, with a total membership of nearly 200,000. Since its foundation, it expended a total of more than $6,600,000 for relief purposes. The president for 1924–25 was Mrs. Grace B. Willard.

WOMAN SUFFRAGE. In almost no other movement was the influence of the War so decisively effective as in the struggle for woman suffrage. There was a striking advance between 1914, when the political franchise was exercised by women in only four countries, and 1918, when full suffrage had been granted them in Austria, Canada, Czecho-Slovakia, Denmark, Finland, Germany, Holland, Hungary, Iceland, Ireland, Norway, Poland, Serbia, Sweden, and the United Kingdom. In general, the new countries created by the War incorporated woman suffrage in their constitutions, as in Palestine and the Ukraine and the Baltic states. In the covenant of the League of Nations there was a clause, by no means a dead letter, making women eligible for all appointments under it. By 1922 it was estimated that there were 138,000,000 enfranchised women in the world. Practically every European country, with the exception of Portugal, Greece, Turkey, and notably France, Italy, and Spain, had established the principle, in 1924. There was full suffrage in all the larger self-governing British dominions, with the exception of South Africa. In India the question had been considered and left with the provinces. Women were voting in one of the provinces of China. In Spain the movement, after 1918, took on new impetus; Egyptian women were active politically in the struggle with Great Britain; the idea was growing in Japan. There had been a sudden and sweeping triumph of the principle of full political equality between 1914 and 1924, which, while due in some countries to the general advance of all democratic movements, was the outcome chiefly of the part played by women in the war-time emergency, and the realization of their importance as an economic factor, then, for the first time.

United States. Although presumably the first expression of the desire of women for the franchise was made in the United States, this country was among the last to grant woman suffrage, in 1920, after 70 years' agitation The campaign for the ballot for women had latterly been carried on along two lines: one aiming to secure State action, the other to put through a Federal amendment. By 1914, full suffrage had been granted by 12 States and Territories: Wyoming, 1869; Colorado, 1893; Utah and Idaho, 1896; Washington, 1910; California, 1911; Arizona, Kansas, and Oregon, 1912; Alaska, 1913; Montana and Nevada, 1914. In

1915, it was estimated that about 4,000,000 women in the United States were eligible to vote. By 1920, at the time the Federal amendment passed, full suffrage had already been won in 15 States (New York, 1917; Michigan, Oklahoma, and South Dakota, 1918), presidential suffrage in 13, the vote in primary elections in 2, and municipal suffrage in a few others. The effort to secure Federal action had met with less encouragement. In 1913 a national woman suffrage amendment resolution was defeated on the ground that the question was a State, not a national, issue. This was followed by mass meetings and parades in protest, petitions to Congress, delegations to the President, and a nation-wide demonstration. The movement made evident progress in the next few years. Whereas in 1912 Roosevelt had been the first important presidential candidate to support it, by 1916 all the presidential candidates had declared for woman suffrage, although the Democratic party did not favor Federal action in the matter. In 1918, the same Federal amendment which, in substance, had been 12 times before Congress since 1878 and four times since 1913, came within two votes of passage by the Senate; but even President Wilson's plea for it as a war measure could not bring about the necessary two-thirds vote. In 1919, however, its passage was finally achieved; by March 22, 1920, 35 States had ratified; and the amendment, now being hastened by both Republican and Democratic parties, came into force, with the ratification of Tennessee in August, in time for women to take part in the presidential election of that fall.

The results of this extension of the franchise up to 1924 were not easily to be estimated. As a rule the proportion of eligible women who voted was smaller than that of the eligible men. The women's vote was recognized as an active menace to vice and liquor interests; it was given credit in large measure for such achievements as the Federal bill giving equal rights of citizenship to married women; and its influence was felt in the increasing volume of welfare legislation throughout the States, such as mothers' pension and child labor laws, illegitimacy and age of consent measures, prison reform and protection of women in industry. It seemed evident, however, that little effort was being made to exert influence directly through women legislators or administrators. Although women had had the right to sit in Congress since Wyoming was admitted to the Union in 1890, and Jeannette Rankin had been elected to that body from Montana in 1916, up to 1924 no other women had been seated, with the exception of two who were elected to complete unexpired terms, and Mrs. Felton, appointed to fill an unexpired term in the Senate and holding her seat for only a few hours. In 1923, among the 5000 or 6000 legislators in the 40 State Legislatures which were in session, there were only 76 women, not more than 10 of them senators. A few women were finding office—in the Federal Department of State, one on the Ohio supreme bench, in the "cabinet" of the Governor of Pennsylvania, as Assistant Attorney General, and occasionally in municipal affairs; but for the most part their activities were confined to agitations for welfare or equality laws through support of the regular party male candidates or by lobbying. An effort in 1921–22 to establish a distinct woman's party was without success. In 1924 women participated in both Republican and Democratic national conventions; and Mrs. LeRoy Springs of South Carolina was placed in nomination for the Democratic candidacy for the vice presidency. A conference of the Woman's party was being called in the latter year to launch a drive to elect more women to Congress.

The question of equal rights had lately achieved prominence. Taking the stand that the Nineteenth Amendment, while granting enfranchisement, did not grant women the full civil and legal equality of citizens, such as that given to the negro in the Fourteenth and Fifteenth Amendments, the National Woman's party was concentrating its efforts on an equal rights amendment to the Federal constitution and was meantime working for blanket equal rights bills before State Legislatures. The equal rights law passed by Wisconsin in 1921 illustrates their aim. It provides that "women shall have the same rights and privileges under the law as men, in the exercise of suffrage, freedom of contract, choice of residence for voting purposes, jury service, holding office, holding and conveying of property, care and custody of children, and in all other respects. The various courts, executive and administrative officers shall construe the statutes where the masculine gender is used to include the feminine gender unless such construction shall deny to females the special protection and privileges they now enjoy for the general welfare." The National League of Women Voters, on the other hand, was opposed to the equal rights principle on the ground that such blanket measures would endanger the existing special rights of women in civil law and endanger present and future legislation protecting women in industry (see WOMEN IN INDUSTRY), and it was directing its activities toward a programme of specific State legislation to remove discriminations against women and to advance the general welfare.

Other Countries. In England, after the succession of the unsympathetic Premier Asquith in 1908, sensational violence and vandalism had been resorted to by the militant wing of the woman suffrage movement, in an effort to overcome public apathy. After 1913, the nonmilitant suffragists had thrown their influence solidly to the sympathetic Labor party, in an endeavor to undermine the Asquith government. Between the two forces, the woman suffrage issue had achieved great prominence. On the outbreak of the War, however, all obstructionist tactics were immediately forsworn by the women of both followings, in favor of prompt and full coöperation with the government. This action and the part that women subsequently played in both administration and industry, during the emergency, quickly converted even those most hostile to the cause of political equality. It was not, however, until 1918 that the Representation of People Act was passed; and then, in order to preserve a majority of male voters, the franchise was granted only to women at least 30 years of age. Some acceleration in welfare legislation became evident thereafter, and through the Women's Freedom League efforts were pledged to gain certain legal equalities; but it soon became apparent that British women, without attempting to form a separate party, were concentrating their efforts on electing representatives from among themselves. The right to sit in Parliament

having been granted in 1918, Lady Astor was returned from Plymouth in the following year; in 1921 the widow of a previous member was returned from Louth; in 1923, eight women were seated, after a vigorous campaign, representing all three parties. One woman was given ministerial rank in the government of Ramsay Macdonald. The petition of Viscountess Rhondda to be allowed to sit in the House of Lords, although unsuccessful in 1922, had not been abandoned in 1924. Recognizing that town and county offices were steps toward seats in Parliament, women were seeking these, successfully, in increasing numbers In 1923 a bill proposing to enfranchise all women over 21 passed its second reading in the House of Commons. In Canada, where there had already been some extension of the privilege, except in Quebec, and full suffrage in the three prairie provinces from 1916, the Dominion government granted the full franchise in 1917 to women who had near relatives at the front; then, in 1918, to all women who had reached the age of 21. A woman was returned to the Dominion Parliament from Alberta in 1918; another was in the cabinet of British Columbia in 1921. No woman, however, could become a senator without amendment of the British North America Act. In Australia, where full parliamentary suffrage was granted by the federal government in 1902, there were 1,100,000 women voters in 1916; but although eligible to both federal houses, women were entitled to sit in the state houses of only South Australia and Queensland. In New Zealand, where full suffrage dated from 1893, about 300,000 women possessed the ballot in 1916 and used it in nearly the same relative proportion as men; they were eligible to all offices except seats in Parliament Statistics for Australia and New Zealand indicated that the female vote had noticeably stimulated the percentage of eligible men voting. Finland, the first division in Europe to grant actual full political enfranchisement to women (1906), had 24 women in its Diet in 1917. Norway established full suffrage and eligibility in 1913 Iceland in 1914 granted the suffrage to women 40 years of age and over; in 1924 suffrage was universal at 25 years. The limited female franchise in Denmark was extended in 1915 to equal suffrage; in 1918 there were nine women in her parliament The women of Holland, enfranchised in 1919 and voting for the first time in 1922, sent seven women to a parliament of 100 members. After the provisional government established in Germany in 1918 granted universal suffrage at the age of 20 years, 40 women were elected to the national assembly, which incorporated adult suffrage in the new constitution. In 1922 there were 35 women in the Reichstag and equally strong representations in the various state diets. In Italy, a suffrage bill passed the Chamber of Deputies in 1923 but was opposed by Mussolini, who, however, approved a bill granting women municipal suffrage. With the defeat of a woman suffrage bill in the Senate in 1922, the issue was shelved in France for another three years.

WOMEN IN INDUSTRY. In an analysis of the status of women in industry in the decade 1914–24 it is necessary to take into account the labor conditions accompanying the War, which for a few years exerted an almost revolutionary influence on the position of wage-earning women and which were responsible for some permanent changes in their industrial status. The augmented demand for labor in war industries and the holes eaten into the ranks of workingmen combined to draw women into work in unusual numbers and often in unusual capacities. And while the War thus widened her field and made the woman in industry a factor of great importance, it brought her problems into unprecedented prominence.

In the United States in 1910 the number of women 10 years of age and over engaged for pay in all occupations was 8,075,772; in 1916 the number was placed at 10,000,000; and in 1918 at 11,000,000 or about 30 per cent of the total number of the gainfully employed. While the fact that some 4,000,000 women were employed in war industries gave rise to an impression that vast numbers of women were taking up gainful labor for the first time, it should not be overlooked that a great number of those in war industries were drawn from other occupations, such as domestic service, laundrying, clerking, office work, and various types of manufacturing; many were married women who before marriage had been industrial workers and who took up their former occupations or even new types of work in response to the emergency call. Moreover, it must be remembered that the so-called war industries included such trades as textile, tobacco, garment, and food manufacturing, which in time of peace employ large numbers of women and which during the War manufactured extensively products needed in the maintenance of armies. The employment and substitution of women for men was most marked in the iron and steel industry, in the manufacture of various vehicles, agricultural inplements, airplanes, and lumber products, and in shipbuilding and transportation. According to census figures, in 1914 women constituted 6.5 per cent of the workers in leading war agent and implement industries. Moreover, it was estimated that in 1916 7 7 per cent of the workers in such industries were women, in 1918, after the first draft, 10.6 per cent; later in that year, after the second draft, 13.9 per cent. The 520,093 women revealed by census figures as engaged in such work on Dec. 15, 1919, made up 8.2 per cent of the total number of employees in these industries. Proved efficiency was beyond doubt one reason for the permanence of women in the newer fields; but in many cases their lower wage rate and lack of organization influenced employers to retain them. The cessation of war manufacturing and the business depression in the succeeding years, however, effected a considerable decrease in the number of women workers. The census of 1920 showing 8,549,511 women 10 years of age and over as gainfully employed represented some actual increase in numbers over 8,075,772 in 1910; but if the increase in population is taken into account, the proportion of all women 10 years old and over in gainful employment decreased from 23.4 per cent in 1910 to 21.1 per cent in 1920. On the whole the great change brought about by the War seemed to have been not a vast increase in the number of women workers nor the invasion of entirely new fields, but a decided shift in the distribution of women among the various gainful occupations in which they had already been employed for some years. In agriculture, forestry, and animal husbandry and in domestic service, the number of women workers showed a striking decrease, although the decrease in agri-

culture was due in part to changes in date and methods of enumeration. The nonagricultural pursuits, as a whole, showed a proportional increase of 19 per cent in the number of women employees in 1920 as compared with 1910. The changes within the group indicated a definite contravention of traditions. In 1910 there were 203 occupations in which 1000 or more women were employed; in 1920 the occupations in this group had increased in number to 232, and a very large part of this increase was in occupations in manufacturing and mechanical industries and professional service. Increases of 50,000 or more occurred among women who were clerks in offices, stenographers and typists, bookkeepers and cashiers, teachers, saleswomen, telephone operators, trained nurses, and clerks in stores. Decreases of 50,000 or more occurred among farm laborers (at home), farm laborers (working out), cooks, general servants, laundresses, dressmakers, and seamstresses (not in factory), and milliners and millinery dealers. Within the manufacturing and mechanical industries, increases of more than 10,000 women since 1910 were found among semiskilled operatives in the food, iron and steel, and clothing industries, in silk and knitting mills, and in electrical supply, shoe, and cigar and tobacco factories; among laborers in cotton mills; and among forewomen and overseers in manufacturing. The changes in rate of increase or decrease for the two sexes were entirely disproportionate, and in far the greater number of cases the women took the lead in the rate of increase. It was significant that while women operatives in automobile factories increased 1408 per cent (from 848 in 1910 to 12,788 in 1920), the largest percentage increase for women in any one industry, men operatives in automobile factories increased only 435.4 per cent, from 20,243 in 1910 to 108,376 in 1920. Although the number of married women, 15 years of age and over, at work, rose from 1,890,661 in 1910 to 1,920,281 in 1920, this group constituted in the latter year only 9 per cent of the total number of women and 23 per cent of the number of women in this age group at work as compared with 10.7 per cent and 24.7 per cent, respectively, in 1910. The problems presented by the employment of women in industry were so greatly accentuated by war conditions that progressive measures were given extraordinary impetus. The futility of long hours for women had been demonstrated in England, and while many attempts were made during the emergency to weaken restrictions, these were not successful on the whole. In the United States a definite trend toward the 8-hour day and 48-hour week was noticeable in legislation (see WAGES). Studies of wage rates indicated that women's wages were consistently lower than those of men, without regard for production or efficiency; even on piecework the guarantee for women was less. The question of a minimum wage for women came to great prominence, minimum wage laws were passed in several States and the District of Columbia; wage orders were issued in increasing numbers by the various State boards; the decision of the Supreme Court in 1923 declaring the minimum wage law of the District of Columbia unconstitutional incited a strong movement for a constitutional amendment to permit such State legislation (see MINIMUM WAGE). The employment of women at night, in home work, and in unsuitable and dangerous occupations was subjected to restrictions, and definite improvements were made in the regulation of working conditions. Beginning in 1911, some safeguarding of motherhood was ensured by law in five States by forbidding employment of women in specified occupations within two weeks before and four weeks after childbirth. (See MATERNITY PROTECTION.) Mothers' pensions (q.v.) continued to grow in favor, to eliminate the need for many self-supporting mothers to enter industry.

Latterly an interesting phase of public sentiment became observable. A group of women active in the equal rights movement in American history and objecting to certain existing legal discriminations against women because of sex advocated a constitutional amendment to take the following form: "Men and women shall have equal rights throughout the United States and every place subject to its jurisdiction. Congress shall have power to enforce this article by appropriate legislation." On the other hand, another large group of women, comprising almost every organization of workingwomen and of women concerned with improving industrial conditions in the United States, although they were deeply interested in the question of equal rights and recognized the need of abolishing unjust legal discriminations against women, objected to the proposed amendment on the score that it was ambiguous and likely to jeopardize those labor laws for women enacted during the preceding 70 years in the various States and regulating to some extent conditions of employment for approximately 4,000,000 women. The proponents of the amendment argued that special labor laws for women curtailed their opportunities, but the opponents maintained that actual information concerning women in industry disproved such a theory and that special legislation to control standards of women's employment was essential in the interest of the race, because they had always been in a weaker position economically than men.

An important outgrowth of the War was the Women's Bureau of the Department of Labor, created as the Woman in Industry Service in 1918 and made permanent in 1920. This Bureau, which represents and advises the Secretary of Labor in all matters concerning women in industry, did much to clarify the situation and to organize efforts toward improvement. It conducted various general investigations of women's hours, working conditions, and prevailing wages, of women as an economic factor in the home, and of the social bearing of the "living wage"; carried on research work; made special studies of the census, of domestic service, of industrial accidents among women, and of special industries; and through monthly bulletins or correspondence developed as a clearing house for ideas and experiences in regard to wage-earning women.

Other Countries. In Great Britain, the number of women gainfully employed increased from 3,307,000 in July, 1914, to 4,845,000 in November, 1918; in July of the latter year 1,826,000 were in government work and 1,521,500 replaced men. The situation was marked by a noticeable shifting of women from occupations such as dressmaking, domestic service, and the textile, paper and printing, and clothing industries, commerce, agriculture, transportation, war industries, and government establishments; this change, as well as the actual numerical increase, was in some measure brought about by organized government effort to dilute the labor

supply. In 1920, from July to November, the employment figure fell from 4,051,000 to 3,871,000; but as compared with the 1914 figures, the number of women workers still showed an increase much larger in proportion than the increase among men. Moreover, the decrease in 1920 seemed due to more or less temporary causes; legal compulsion and trade agreements to reinstate men and boys after the War, public sentiment on behalf of returning troops, and the attitude of male workers; while causes tending to the increased employment of women, such as realization of their wider abilities and efficiency and the cheapness of their labor, were permanent forces. Government regulation of women's wages broadened during the period (see MINIMUM WAGE); the same piece and overtime rates were being paid women on men's work in war industries; minimum wages were set in many kinds of women's work; in some trades women were receiving, roughly, equivalent wages for equivalent work. Although in the early months of the War women frequently worked over 70 hours a week, experience showed that shorter hours increased efficiency, and by 1921 the movement for a 48-hour week was assuming definite legislative form. The Health of Munition Workers' Committee, appointed in 1915, had a far-reaching influence on women's working conditions. Reports from all parts of Europe during the War indicated that there remained scarcely any branch of industrial effort into which women had not entered This was true also in Canada and Australia. This virtual revolution was reflected in every industrial nation, including Japan, and in many which were still predominantly agricultural, such as Russia and the South American republics. There was generally observable a tendency under war-time stress to relax restrictions. In Germany, rather early in the War, various establishments were exempted from regulations, on permit, and the factory inspection system was allowed to deteriorate. Following this period in which the problems of women in industry became accentuated, there was everywhere a notable extension of regulation. An order of the French Minister of Munitions in 1917 was particularly comprehensive, fixing an age limit of 13 and a 10-hour day with a rest period, restricting work at night and in dangerous occupations, safeguarding pregnancy and childbirth, and setting detailed sanitary standards. Peru passed a progressive women's and child labor law in 1918. Among efforts to ease labor readjustment, after the return of the troops, and the consequent increase of unemployment among women workers, the German plan was noteworthy. Provision was made to train women for peace work, courses being given in general housework, children's nursing, dressmaking, typing, secretaryship, and similar occupations; all women in receipt of unemployment allowances were obliged to take up some course. A somewhat similar plan was followed in England for unemployed women between the ages of 18 and 35. See LABOR ORGANIZATION, INTERNATIONAL; LABOR LEGISLATION; HOURS OF LABOR.

WOMEN'S CHRISTIAN TEMPERANCE UNION, NATIONAL. This body was organized in 1874 for the purpose of abolishing the legalized liquor traffic; ever since it has continued to "agitate, educate, and organize." During the decade 1914–24 it was especially active. In 1914 definite plans were made for an active campaign for a national constitutional prohibition amendment; one of its spectacular features was the presentation to Congress of a huge petition. When in 1917 Congress passed a resolution for the submission of a prohibition amendment to the States for ratification, and when later 45 of the States or nine more than the necessary number ratified, it was generally conceded by the press and public that great credit for the achievement was due to the Woman's Christian Temperance Union. The National W. C. T. U. was also instrumental during these years in creating sentiment for the passage of a prohibition law for the District of Columbia, and the anti-advertising and war-time prohibition laws In 1918 a memorial promoted by the W. C. T. U. was sent to President Wilson; signed by 6,000,000 of the nation's most distinguished women, it asked that the use of foodstuffs in the manufacture of alcoholic liquors be prohibited

In 1917, the National W. C. T. U., in common with other patriotic societies, organized for war work. It adopted 3000 French war orphans and furnished ambulances and diet kitchens. It made thousands of comfort kits for soldiers and sailors and knitted innumerable socks, scarfs, and sweaters; it maintained resident hospital-mothers in reconstruction hospitals, invested liberally in Liberty Bonds and War Savings Stamps, and was diligent in conserving food and cultivating and canning fruits and vegetables. In 1919, it began a drive for 1,000,000 members and $1,000,000. The $1,000,000 fund was to be used for the promotion of special departments of the organization's work, the Americanization of the foreign-speaking women; the promotion of child welfare, social morality, general health; the education of the people and especially the children in the schools on the truths of science concerning alcohol; the protection of women in industry, and the furtherance of world sobriety. In the interests of the world movement, Anna A. Gordon, national president, was commissioned to visit and make a survey of European countries in 1920, following the World's W. C. T. U. convention in London, England; in 1921, she was sent for the same purpose to South America, and in 1922, to Mexico. Special work was done during the decade, among the young people and children, by the Young People's Branch and Loyal Temperance Legion respectively. The headquarters of the National W. C. T. U. is at Evanston, Ill., on the same lot with the historic cottage which was for many years the home of Frances E. Willard. The officers are: president, Anna A. Gordon; vice president, Mrs. Ella A. Boole; corresponding secretary, Mrs Frances P. Parks; recording secretary, Mrs. Elizabeth P. Anderson; assistant recording secretary, Mrs. Sara H. Hoge; treasurer, Mrs. Margaret C. Munns. The official paper of the National W. C. T. U. is *The Union Signal.* The organization also publishes *The Young Crusader,* a periodical for boys and girls. In its commodious publishing house at headquarters it has a large stock of literature which is widely used in its educational campaigns. The National W. C. T. U. celebrated its fiftieth anniversary in 1924 and held its jubilee convention in Chicago in November, 1924.

WOMEN'S CLUBS, GENERAL FEDERATION OF. An organization established in 1889. Its membership includes women's clubs, State federations, Territorial federations, and kindred organizations. Conventions are held biennially. Much valuable work was done by the women's clubs of the country in connection with the

War Aid was given to the Red Cross, Liberty Loan committees, and other organizations for war relief. In 1918 *The General Federation Magazine* was purchased by the Federation and made its official organ. Special divisions of Americanization, community service, and thrift were established in 1919. At the fifteenth biennial convention, held in Des Moines in 1920, many resolutions were adopted, for the most part reaffirming previous measures deemed necessary to the future welfare of the country. These measures took the form of urging legislation on the government. At this convention the departments of the Federation were reorganized. In 1921 a Committee on International Relations was created Mrs Thomas G. Winter, president of the General Federation, was appointed by President Harding one of the four women on the Advisory Committee of the Washington Conference for the Limitation of Armaments. A Committee on Friendly Relations with the Ex-Soldier did excellent work during 1921. In this year the Federation purchased the home of Gen. Nelson A. Miles in Washington for permanent headquarters, and in 1922 this became the executive headquarters of the Federation. The sixteenth biennial convention was held at Chautauqua, N Y. in 1922. There was discussion on immigration, law enforcement, the arms conference, Pan-American relations, and other subjects of current interest. The Council of the General Federation met at Atlanta, Ga., in May, 1923. The biennial convention was held in Los Angeles, Cal., in 1924. The membership of the Federation is approximately 2,500,000. The president in 1923 was Mrs. T. G. Winter.

WOOD, CLEMENT (1888–). An American author, born at Tuscaloosa, Ala., and educated at the University of Alabama and Yale University. He began the practice of law at Birmingham, Ala., in 1911. After holding the offices of assistant city attorney and recorder of Birmingham, he came to New York City and taught in the Barnard School for Boys from 1915 to 1920 and became vice principal of the Dwight School in 1920. His writings include: *Glad of Earth*, poems (1917); *The Earth Turns South* (1919); *Jehovah* (1920); *Mountain*, a novel (1920); *The Laugher* (1922); *Nigger* (1922); *Poets of America* (1924). He received the first prize of the Newark (N. J.) Committee of 100 in 1916 for his poem *The Smithy of God* and a prize for his *Jehovah* in 1919.

WOOD, ERIC FISHER (1889–). An American author and architect, born in New York City, and educated at Yale and Columbia Universities and in Paris. In 1914 he was civil attaché at the American Embassy in Paris and in 1915 served as an officer in the American Ambulance Corps in France. He was commissioned major in the British Army in 1917 and major in the United States National Army in August of the same year. He acted as assistant chief of staff for the 83rd Division and as Lieutenant-Colonel and assistant chief of staff in the 88th Division. He was wounded in the battle of the Meuse-Argonne. He is the author of *Notebook of an Attaché*, *The Writing on the Wall* (1916), *Notebook of an Intelligence Officer* and *Biography of Leonard Wood* (1920). He also contributed articles to magazines.

WOOD, LEONARD (1860–1927). An American soldier and administrator (see VOL. XXIII). At the outbreak of the War he was given command of the department of the East, which he held till 1917, and was later transferred to the Southeastern Department. He organized and trained the 89th National Army Division, the 10th Division of the Regular Army, and many special regiments and battalions during 1918 and 1919, and commanded the Central Department headquarters in Chicago from 1919 to 1921. He was appointed governor general of the Philippine Islands in 1921. He wrote: *The Military Obligation of Citizenship* (1915); *Universal Military Training* (1917); *Our Military History, Its Facts and Fallacies* (1921).

WOODBURY, HELEN SUMNER (1876–). An American writer, born at Sheboygan, Wis., and educated at Wellesley College. For more than 20 years she has worked with the American Bureau of Industrial Research. During 1906 and 1907 she investigated equal suffrage in Colorado and in 1913 entered the Children's Bureau of the Department of Labor as an industrial expert; she was assistant chief from 1915 to 1918. She visited New Zealand and Australia during 1919–20. Her writings include: *The White Slave* (1896); *Labor Problems*, with Thomas S. Adams (1905); *Equal Suffrage* (1909); *History of Women in Industry*, vol. ix; *Report on Women and Children in Industry*, United States Labor Bureau (1911); *Child Labor Legislation in the United States*, with Ella A. Merritt (1915); *Administration of Child Labor Laws in Connecticut and in New York*, with Ethel E. Hanks (1915; 1916); *History of Labor in the United States*, with John R. Commons and others (1918); *The Working Children of Boston* (1922).

WOODHOUSE, HENRY (1884–) An American aviation expert, born at Turin, Italy. He arrived in the United States in 1904, became contributing editor of *The Air Scout* in 1910, and later founded the aeronautical periodicals, *Flying* and *The Aërial Age*. His contributions to the literature of flying and the enthusiastic pioneer spirit which led him to found the Aëronautical Library in 1914, to build at Atlantic City the first airport in the world, to finance expert research work in aëronautics, to plan and direct the making of the first aëronautic maps in 1913, and to draft the first regulations of aërial navigation, place him among the most notable figures in this new field. Mr. Woodhouse did much toward the organization of aeronautics during the War, prepared the first report on the aircraft situation for the Secretary of War, and assisted the government in investigating war profiteering. His publications include: *The Struggle for World Resources; Textbook of Naval Aëronautics; Textbook of Military Aëronautics; Textbook of Applied Aëronautic Engineering; Textbook of Aërial Navigation; Aëro Blue Book.*

WOOD PULP. See PAPER AND WOOD PULP.

WOODRUFF, EDWIN HAMLIN (1862–). An American lawyer and educator, born in Ithaca, N. Y., and educated at Cornell University and its law department. He was admitted to the bar in 1888, and was instructor in English at Cornell from 1888 to 1890. He was librarian at the Fiske Library in Florence, Italy, in 1890–91. From 1893 to 1896 he was on the law faculty of Stanford University and from the latter date professor of law at Cornell University. From 1914 to 1921 he was dean of the College of Law at Cornell. He wrote several books on legal subjects.

WOODRUFF, HELEN S. (1880–). An American author, born at Selma, Ala., and educated privately. She first became known by her book, *The Lady of the Lighthouse,* which was a "best seller" in 1913. She gave all the royalties from this story to the New York Association for the Blind; the proceeds from all her books go to charity. She has written several plays, among them: *Hurrah for the Girls* (1918), produced at the Forty-fourth Street Roof Garden, New York City; *Kitty, Kitty, Kitty* (1919); *By Love's Speedometer* (1919). Her stories include: *Mis' Beauty* (1912); *Really-Truly Nature Stories* (1913); *The Little House* (1914); *Really-Truly Fairy Stories* (1915); *Mr. Doctor-Man* (1915).

WOODRUFF, LORANDE LOSS (1879–). An American zoölogist, born in New York City, and educated at Columbia University. He was assistant in biology (1903–04) and instructor (1904–07) at Williams College; and instructor (1907–09), assistant professor (1909–15), and professor (1915–) at Yale University. Professor Woodruff's researches were mainly on the protozoa, in connection with which he studied especially the reproductive rhythms and the phenomena of endomixis. He published, in collaboration, *Origin and Evolution of the Earth and Its Inhabitants* (1918), and *Foundations of Biology* (1920). He was also the author of numerous articles in zoölogical journals on the reproductive processes in the protozoa.

WOODS, ALBERT FRED (1866–). An American educator (see VOL. XXIII). From 1917 to 1920 he was executive officer of the Maryland State Board of Agriculture and president of the Maryland State College of Agriculture. He was chosen president of the University of Maryland in July, 1920.

WOODS, CYRUS E (1861–). An American diplomat, born at Clearfield, Pa., and educated at Lafayette College. He began the practice of law in Philadelphia in 1889. He was president of the Pennsylvania State Senate (1905–08), minister to Portugal (1912–15), and Secretary of the State of Pennsylvania (1915–23), but resigned in June, 1921, on his nomination by President Harding as ambassador to Spain. On Mar. 4, 1923, he was appointed ambassador to Japan.

WOODWARD, FREDERICK CAMPBELL (1874–). An American lawyer and educator, born at Middletown, N. Y., and educated in law at Cornell University. In 1895 he began the practice of law in New York City. From 1898 to 1902 he was professor of law at Dickinson College, and from the latter date to 1907 he filled the same chair in Northwestern University. From 1907 to 1916 he was professor of law and dean of the law school of Leland Stanford University and in the latter year became dean of the law school of the University of Chicago. He was the author of several books on legal subjects. During the War he served as major and judge-advocate-general in the United States Army.

WOODWORTH, ROBERT SESSIONS (1869–). An American psychologist (see VOL. XXIII). His books published after 1914 show an attempt to profit by the emphasis of the behavioristic school on external observation, without, however, accepting their metaphysical position These works include *Dynamic Psychology* (1917) and *Psychology a Study of Mental Life* (1921).

WOOLEN AND WORSTED. See TEXTILE MANUFACTURING.

WOOLLCOTT, ALEXANDER (1887–). An American dramatic critic, born at Phalanx, N. J., and educated at Hamilton College and Columbia University. He joined the staff of the New York *Times* in 1909, becoming dramatic critic in 1914. He was also on the editorial staff of *The Home Sector.* He enlisted in the United States Army in 1917 and served in France till May 1, 1919. He was a member of the editorial council of *The Stars and Stripes* and correspondent for that paper at the American front and with the army of occupation in Germany. His writings include: *Mrs. Fiske—Her Views on Acting, Actors, and the Problems of the Stage* (1917); *The Command Is Forward* (1919), and articles in many magazines.

WOOSTER, COLLEGE OF. A coeducational institution founded at Wooster, Ohio, in 1870. The size of the student body increased from 433 in 1914 to 808 in 1924, the faculty from 29 to 43 members, and the library from 37,000 to 51,500 volumes. The endowment rose from $1,174,780 in 1913 to $1,813,886 in 1923 and the annual income from $104,335 to $202,562. The preparatory school connected with the college was discontinued, and the building it had occupied was given over to the departments of mathematics and physics. A girls' dormitory was built, and two private houses were converted into cottage dormitories. In 1924 funds were being made available for a large boys' dormitory and for a social hall. The Rev. Charles F. Wishart, LL.D., succeeded the Rev. Lewis E. Holden, LL.D., as president.

WORCESTER. The second city of Massachusetts. The population increased from 145,986 in 1910 to 179,754 in 1920, and to 191,927 by estimate of the Bureau of the Census for 1923. A new reinforced concrete bridge was built between 1916 and 1919 over Lake Quinsigamond at a cost of $325,000. It was 60 feet wide and had 6 arches and a 100-foot viaduct. The park system of the city was expanded. A comprehensive city plan was developed at a cost to the city of $50,000.

WORCESTER MUSIC FESTIVAL. See MUSIC, *Festivals.*

WORCESTER POLYTECHNIC INSTITUTE. A nonsectarian institution at Worcester, Mass., for the education of men in the professions of engineering and chemistry, founded in 1865. The student enrollment in 1915 was 543, as compared with 520 in 1923–24; the faculty numbered 54 in the former year, as compared with 64 in the latter. In the same period the library was increased from 14,544 to 18,000 volumes and the productive funds from $900,000 to $2,450,000. A new gymnasium was opened in 1916, and some courses in business were offered in 1922. President, Ira Nelson Hollis.

WORK, HUBERT (1860–). An American public official, born at Marion Centre, Pa., and educated at the University of Pennsylvania He began the practice of medicine at Greeley, Colo., in 1885. In 1896 he founded the Woodcroft Hospital for mental and nervous diseases. In 1912 he was chairman of the Colorado Republican State Central Committee and Colorado member of the Republican National Committee. During 1921–22 he was first assistant postmaster general of the United States, and in March, 1922, he became postmaster general. He

received the appointment of lieutenant-colonel in the Medical Corps of the United States Army during the War. He has held offices in various medical societies.

WORKERS' PARTY. See COMMUNISM.

WORKMEN'S COMPENSATION. At the end of the year 1923, compensation laws had been enacted in all the States and Territories of the United States, with the exception of Arkansas, Florida, Mississippi, Missouri, North Carolina, and South Carolina. There was a Federal law covering employees of the United States government but no law covering private employments in the District of Columbia. Most foreign countries likewise had adopted the compensation principle.

While workmen's compensation had been so generally adopted and was so generally approved that it might be considered an accepted part of the fabric of social legislation, the fact that a compensation law was in force in a given jurisdiction did not necessarily mean that the compensation principle was completely applied. The various laws which were on the statute books were in large measure the result of compromise and embodied limitations which seriously impaired their efficacy. There was a wide variation in the extent to which workingmen were covered. It was estimated in 1920 by Carl Hookstadt of the United States Bureau of Labor Statistics that approximately 70 per cent of the employees in jurisdictions subject to compensation actually came within the terms of the compensation acts. The percentage of such employees varied from approximately 20 per cent in Porto Rico to almost 100 per cent in New Jersey. There was also great variation in the liberality of the benefits provided in the various laws, both in the basic percentages of wages which were paid in case of disability and in the limitations on periodical and total payments. In fact, compensation legislation was so diverse in all its parts that any general statement must be so qualified in its application to particular cases as to leave some doubt of what actually constituted the compensation principle.

An analysis of the laws of the States and Territories of the United States (*Digest of Workmen's Compensation Laws in the United States and Territories, with Annotations*, 8th ed., revised to Dec. 1, 1923; Workmen's Compensation Publicity Bureau, New York City) shows that 12 States and 2 Territories had enacted compulsory laws, while 30 States and 1 Territory had enacted elective laws. Elective laws, while ostensibly permitting choice on the part of the employer or employee, in effect made election not to adopt the provisions of the law so disadvantageous that they were in practical effect compulsory. In most jurisdictions it was recognized by requiring insurance deposit of security or proof of financial responsibility that a compensation law should not only provide for payment of compensation to workmen by employers but should in addition require that the employer give evidence of security for such payment. There were, however, 5 jurisdictions in which no such security was required: Alabama, Arizona, Kansas, Louisiana, and Alaska.

The point of greatest controversy in the drafting of compensation legislation was the method of insurance to be furnished employers. In 7 States and 1 Territory monopolistic State-managed funds had been established as exclusive insurers of the workmen's compensation obligation. In 9 States, State-managed funds competed with private insurance carriers, and employers were permitted to select either agency for the insurance of their compensation obligations. In 26 States and 2 Territories the government confined itself to the regulation of private carriers.

The administration of the compensation principle is a specialized problem calling for a high degree of professional ability. This was recognized by 34 States and 2 Territories as well as by the Federal government by the appointment of special administrative officials for this work. Administration of compensation in the ordinary course of business of the court was generally admitted to be impractical. There were still, however, 8 States and 1 Territory which had provided no special administrative facilities. While the principle of compensation was by 1924 accepted practically without question, the problems incident to its application had been solved only to a limited extent. Much remained to be done in the development of statutory provisions and of administrative practice to the end that the application of compensation might be consonant with its underlying theory. Development in the future was expected to take the form of increased liberality to workmen and of perfection of details of legislation and of practice which would eliminate to a considerable degree the existing illogical and unsound discriminations and variations. See LABOR LEGISLATION, *Supreme Court Decisions;* SOCIAL INSURANCE.

WORLD COURT. See LEAGUE OF NATIONS.

WORLD LEAGUE AGAINST ALCOHOLISM. A world-wide movement against the liquor traffic, embracing 16 national organizations in 12 countries. It was established in Washington D. C., in June, 1919. By 1923 it included 48 national organizations representing 31 countries. Triennial conventions are held. The first of these was in Toronto in 1922. Over 1100 delegates representing 66 countries were present. The League coöperates with national temperance organizations through speakers, literature, posters, pamphlets, books, etc. Under its auspices representatives have been sent to the British Isles, and, with a few minor exceptions, to every country of continental Europe, Iceland, China, Japan, the Philippine Islands, India, Ceylon, Australia, New Zealand, the Fiji Islands, South Africa, Rhodesia, Mozambique, Zanzibar, Egypt, Tunis, Algeria, Morocco, several points in West Africa, Chile, Porto Rico, Cuba, and Mexico. A social research office is maintained in New York City, a scientific research department in Boston, a students' department in Washington, D. C.; a Canadian office in Toronto, Mexican and Pan-American offices in Mexico City, a Scandinavian office in Christiania, Norway; a scientific and information department at Lausanne, Switzerland, and an international publicity office at London. The Anti-Saloon League of America is a constituent member of the World League. Its temporary headquarters are at Westerville, Ohio. There were, in 1923, four joint presidents: Anna A. Gordon, for the United States; Robert Hercod, Ph.D., Switzerland; Rt. Hon. Lief Jones, England; and Howard H. Russell, D.D., LL.D., United States. In 1923 the American Bishop James Cannon Jr. was chairman of the executive committee, and Ernest H. Cherrington, LL.D., Litt.D., also an American, was general secretary.

WORLD WAR. See WAR IN EUROPE.

WOUNDS, TREATMENT OF. The experience of the War presumably made some changes in the treatment of wounds in civil and industrial surgery, which were summed up by a Viennese surgeon, Professor Albert, as follows. Mere asepsis or surgical cleanliness was found to be quite insufficient to control war wounds after these had had time to become infected. In other words the original Listerian doctrine of antiseptic treatment, once sidetracked, again took the lead. It was learned that while chemical agencies are unable to arrest infection by destruction of bacterial life, they are still able to antagonize the latter by stimulating the natural defensive forces of the body. As for tissues hopelessly infected, they may be cut away bodily to a certain extent. Ultraviolet light and tincture of iodine are able to destroy a certain number of bacteria. Mechanical resources such as proper drainage and irrigation are incidentally of benefit; gauze dressings exert a suction on the wound surfaces and thus reinforce irrigation. Any wound over eight hours old is regarded as already infected. Wounds which have failed to unite and so become known technically as granulating surfaces may be treated by ointments. In other words, from military experience it was learned that the best treatment of wounds is one which encourages the tissues to fight their own battles. The Carrell-Dakin treatment of wounds by irrigation with a weak sodium hyposulphite irrigation should be one of the best resources for this purpose, although it does not seem to be adapted to cases in which crippling is threatened, for under such circumstances immobilization is desirable, and this can hardly be obtained if the dressings have to be changed frequently.

WRANGEL, PETER NICHOLAIEVITCH (1879–). A Russian general, born at Petrograd, the oldest son of a Baltic nobleman of Swedish descent. He finished a brilliant academic career at the mining institute of Petrograd but later turned to the army, became a private soldier, and rose by merit until in 1915 he commanded a Cossack regiment and later a Cossack division. From its beginning he resisted the Bolshevik revolution. With a volunteer army operating in the Crimea, he severely defeated the Soviet forces, and when finally overwhelmed by superior numbers in 1920, he managed to retreat in good order. After the collapse of the counter-revolution, General Wrangel and a remnant of his men found refuge in Jugo-Slavia and Bulgaria.

WRANGELL ISLAND. Named after the Russian explorer, Ferdinand Wrangell, this island is about 71° north latitude and 180° west longitude, some 80 miles from the Siberian mainland. It is a desolate, valueless island, and is rarely visited because of the impassable ice-pack which usually encompasses it. Sighted by Long and other American whalers in 1867, it was believed by the learned German geographer Petermann to be of continental proportions extending across the Arctic zone. This accepted theory was exploded by the drift of the *Jeannette* to the North. The area of the island is about 2500 square miles, according to Berry, who explored it in 1881, as did Hooper, who named it New Columbia and claimed it for the United States. Wrangell Island remained unoccupied until a private expedition of four men and an Eskimo woman was sent to it in 1921 by Stefansson. Ice conditions prevented their relief in 1922, when local resources also failed. In 1923 the visiting ship found only the Eskimo woman still alive. One white man, Wells, and 12 Eskimos from Alaska occupied the island in the summer of 1923. They were equipped with supplies for 2 years. Furs and an airplane base were their objects. Meantime the Russians, who never even visited Wrangell Island, claimed it as an island possession.

WRESTLING. See SPORTS.

WRIGHT, SIR ALMROTH (1861–). A British physician (see VOL. XXIII). During the War, Wright was consulting physician to the Allied Armies in matters relating to infection, preventive vaccination, etc. In 1915 appeared his monograph *Wound Infection.* In collaboration with Colebrook he published *Technique of the Teat and Capillary Glass Tube* (1921).

WRIGHT, ORVILLE (1871–). An American inventor (see VOL. XXIII). He won the Elliot Cresson Medal of Franklin Institute (1914) and the John Fritz Medal, and the bronze medal of the International Peace Society (1920). He was appointed chairman of the Contest Committee of the National Aëronautic Association, succeeding Col. F. P. Lahm, in 1924. He was made an officer of the Legion of Honor in 1924.

WUNDT, WILHELM (1832–1920). A leading German philosopher of the last generation (see VOL. XXIII). During his last years he terminated his 10-volume *Völkerpsychologie* (1901–20). During the War, he used his pen to defend his fatherland against what he considered the unjust accusations of western writers. He wrote a number of articles, notably in *Scientia,* and also a volume in which he dissected the national psychologies of the warring groups (*Die Nationen und Ihre Philosophie, ein Kapitel zum Weltkrieg* (1915). Wundt's death was internationally mourned. In the United States a large group of psychologists who had been trained in his Leipzig laboratory published testimonials in honor of their master.

WÜRTTEMBERG. Württemberg, always one of the most democratic states of Germany, possessed a fairly liberal constitution. The Weizsäcker ministry, in office during the War, pursued on the whole a rather democratic policy, but was opposed to the demands of the Democratic party for far-reaching parliamentary reforms. Under the influence of the disastrous events in the fall of 1918 this ministry gave way in October to a more democratic government, which in turn was shortly afterward superseded by the Socialist provisional government of the November revolution. King William II, a man of rather democratic tendencies, renounced his throne but continued to reside unmolested within the confines of his former realm. On Nov. 11, 1918, the bourgeois parties, exclusive of the Nationalists, entered the provisional government, from which the Independent Socialists resigned in January, 1919. The Württemberg government which was formed by a coalition of Majority Socialists, Centrists, Democrats, and members of the German People's party was perhaps of all the German governments the most thoroughly republican and democratic. In the succeeding years, thanks to democratic traditions and the existence of a large middle class, this small state was comparatively free from the violent disturbances created in other sections by the monarchist Right and the revolutionary Left. It was for this reason that the republican government of the Reich sought refuge in Württem-

berg during the critical days of the Kapp Putsch in March, 1920.

The elections for the Constituent Assembly in January, 1919, returned 52 Majority Socialists, 38 Democrats, 31 Centrists, 25 Conservatives, and 4 Independent Socialists. On Apr. 26, 1919, the Assembly adopted a provisional constitution, Württemberg being second only to democratic Baden in the drafting of a fundamental law. Since the later promulgation of the constitution of the Reich necessitated many changes, the final constitution was not completed till Sept. 25. 1919. The chief provisions, as in the case of the fundamental laws of all other German states, were strictly circumscribed by the Constitution of the Reich. The supreme power was vested in the people. The people delegated this power to the Diet, which transferred the executive power to the ministry. The government was empowered to refer the question of the dissolution of the Diet to a referendum of the people whenever it saw fit to take such action. A singular feature was the provision for the formation of a new ministry after each election of the Diet. Although the ministry was dependent on the legislative body in any event, this provision was made to prevent any unnecessary delay and dilatory tactics. The minister-president had the title of President of the State and was elected by the Diet. It was his duty to appoint the members of the cabinet in conformity with the wishes of the Diet. The administration of the state was, however, conducted by the ministers individually. Noteworthy also was the provision for the attachment to the ministry of councils representing the various classes in the population. Württemberg's constitution was drafted with careful regard for the practical application of democratic theories, and for this reason, as well as for others, democratic government in Württemberg worked more smoothly than it did in other German states. The first elections for the Diet under the new constitution were held in June, 1920, and resulted in an increase of the representation of the Left and the Right The losses suffered by the republican middle parties were largely due to the unsatisfactory conditions prevailing in the Reich. In consequence thereof the government resigned, and a new ministry was formed by the Centrists and the Democrats, which received the support of the German People's party and the Social Democrats. From 1920 to 1924 no outstanding developments appeared, except that Württemberg, like the remainder of the Reich, experienced further swings to the Right and the Left. See GERMANY.

WYER, RAYMOND (?–) A critic and art director, born in London, and educated in Edinburgh, London, Brussels, and Paris. He became the director of the Hackley Art Gallery at Muskegon, Mich., and continued in that office during 1912–16. He organized exhibits of American and European artists and lectured on art in various cities of the United States He is the author of *Art and the Man, An Art Museum, Its Concept and Conduct, Art and Discrimination,* and an *Inaugural Catalogue of Hackley Art Gallery.* He also wrote a war play in two acts, entitled *The Goal,* and several articles on Armenia.

WYNN, EDWARD (1886–). An American comedian, born at Philadelphia He ran away from home at 15 and went into vaudeville. During 1914–15 he acted in Ziegfield's Follies and in the next year appeared at the Winter Garden in New York City. He became a star in 1918. He wrote the music, lyrics, and book of the *Ed Wynn Carnival* (1919) and *The Perfect Fool* (1921).

WYOMING. Wyoming is the eighth State in size (97,914 square miles), and the forty-seventh in population; capital, Cheyenne. The population increased from 145,965 in 1910 to 194,402 in 1920, a gain of 33.2 per cent The white population increased from 140,318 to 190,-146; the number of Indians decreased from 1486 to 1343, and negroes, from 2235 to 1375. The native white population rose from 113,200 to 164,891; the foreign-born white decreased from 27,118 to 25,255. Both urban and rural populations mounted, the former from 43,221 to 57,-348; the latter from 102,744 to 137,054. There are only two important cities in the State, Cheyenne and Casper. The former increased from 11,320 in 1910 to 13,829 in 1920, and the latter from 2639 to 11,447.

Agriculture. Wyoming, in common with most of the far western States, showed an increase in all agricultural activities in the decade. While the population of the State increased 33.2 per cent, the number of farms increased 43.3 per cent (from 10,987 in 1910 to 15,748 in 1920); the acreage of farms increased 38.2 per cent (from 8,543,010 to 11,809,351); and the improved land in farms 67.3 per cent (from 1,256,160 acres to 2,102,005). The percentage of total land area used for agricultural purposes increased from 13.7 in 1910 to 18 9 in 1920; the proportion of improved farm land from 14.7 to 17 8 per cent. The total value of farm property showed an apparent increase from $167,189,081 to $334,410,590, or 100 per cent; the average value per farm, from $15,217 to $21,-235. In interpreting these values and indeed all comparative values in the decade 1914–24, the inflation of the currency in the latter part of the period is to be taken into consideration. The index number of prices paid to producers of farm products in the United States was 104 in 1910 and 216 in 1920. Of the total of 15,748 farms in 1920, 13,403 were operated by owners, 377 by managers, and 1968 by tenants. The corresponding figures for 1910 were 9779, 311, and 897. White farmers in 1920 numbered 15,-579. 13,306 native, and 2273 foreign-born. There were 169 colored farmers, of whom 134 were Indians. In 1910 the white farmers numbered 10,922 (9019 native and 1903 foreign-born); and in that year, 44 of the 65 colored farmers were Indians. Farms free from mortgage in 1920 numbered 6816, compared with 7815 in 1910; those under mortgage, 5513, compared with 1923. The acreage under irrigation increased from 1,133,302 in 1909 to 1,207,982 in 1919. The number of dairy cows increased from 32,699 to 41,615; and "beef cows" from 307,189 to 392 367; sheep decreased in number from 4,-826,565 to 1,859,775 The estimated production of the principal farm crops in 1920 was as follows· corn, 2,316,000 bushels; spring wheat, 2,-384,000, winter wheat, 225,000; oats, 6,612,000; barley, 363,000; potatoes, 2,107,000, and hay, 1,444,000 tons. Comparative figures for 1913 are· corn, 493,000 bushels; wheat, 2,250,000; oats, 8,360,000; barley, 396,000; potatoes, 1,680,-000; and hay, 912,000 tons.

Mining. Wyoming has very valuable mineral resources which have not yet been fully developed. The most important products in point of value are petroleum, coal, natural gas, and nat-

ural gas gasoline. The growth of the petroleum industry, 1914–24, is indicated by the following production figures: 1914, 3,560,375 barrels; 1915, 4,245,525; 1916, 6,234,137; 1917, 8,978,680, 1918, 12,596,287; 1920, 16,831,000; 1921, 19,332,800; and 1922, 26,715,000 The output of coal also increased during the decade. in 1914 it was 6,475,293 net tons; 1915, 6,554,028; 1916, 7,910,647; 1917, 8,575,619; 1918, 9,438,688; 1920, 9,630,271; 1921, 7,200,666; and 1922, 5,971,724 The State produced also a large amount of natural gas gasoline: in 1920, 8,711,037; 1921, 14,557,684 gallons Among other mineral products are gypsum, iron ore, sand and gravel, and stone The total value of the mineral production in 1921 was $51,365,150, compared with $83,034,397 in 1920; $41,097,209 in 1919; $42,595,812 in 1918; and $12,417,752 in 1914.

Education. The immense area and large rural population of Wyoming bring with them the educational problems associated with these conditions Steady progress was made from 1913 on. In 1913 the Superintendent of Education was directed to prepare a course of study for the elementary schools In 1915 a law was passed requiring physical examination of school children; a State Institute was established, and a law was enacted providing for a school code committee to arrange for a survey by the Federal Bureau of Education. The report of this survey was rendered in 1916. In the following year the Legislature adopted a school code, providing for a State Board of Education, and greatly enlarging the duties and powers of the department, this code was amended in 1918 A director of special classes devoted special attention to the elementary, rural, and high schools of the State and examined children, conducted mental surveys, and reorganized rural schools. The director of vocational education had general charge of this work. The efforts of the Department of Education were centred in later years largely on the rural schools. In July, 1918, a movement was launched for so-called standard rural schools, this resulted in greatly improved conditions. In secondary education the Department of Education aimed at the maintenance of accredited four-year high schools wherever the number of students and the financial support available made it possible. In 1922 there were 38 such schools Vocational education, including courses in agriculture, industrial occupations, and home economics, was carried on with success in spite of great difficulties. It was the desire of the Department of Education to extend vocational education to every young person desiring to enter agriculture, business, or home-making without university training Work was also being carried on under the Federal Vocational Rehabilitation Law of 1920; a State enactment provided coöperation The total enrollment in all the schools of the State in 1912 was 26,502; 1921–22, 47,988 The high school enrollment in the latter year was 5763 The total disbursement for schools in 1922 was $6,404,645 Illiteracy in the State decreased from 3.8 per cent in 1910 to 2.5 in 1920. In the native white population it remained at 0 4 per cent; among the foreign-born, it decreased from 9.5 to 9.2 per cent; among the negro, it increased from 5.3 per cent to 6 1

Finance. For finance, see STATE FINANCES.

Political and Other Events. The political history of Wyoming in the decade 1914–24 was not especially eventful. Elections were held in 1914 for governor and Congressmen. The Democratic candidate for governor, John B. Kendrick, was elected, while the Republicans elected their Representative and the majority in both houses of the Legislature In 1916 the State, up to that time normally Republican, gave its vote to President Wilson, while Governor Kendrick, Democratic nominee, defeated Clarence D. Clarke for the Senate The Republicans, however, carried both branches of the Legislature In the voting for president in that year, President Wilson received 28,316 votes; Charles E. Hughes, 21,698. The Republicans, in 1918, elected their candidate for governor, Robert D. Carey, while Senator Warren, Republican, was reëlected to the Senate. In the presidential voting in 1920, W. G. Harding received 35 091 votes, J. M. Cox, 17,429 Elections were held in 1922 for United States Senator and for State officers The Democrats were in the main successful, electing their candidate for governor, W. B Ross. Senator Kendrick was reëlected to the Senate. On Aug. 14, 1923, an explosion in the coal mine at Kammerer resulted in the death of 100 miners The leasing of oil reserves in the Teapot Dome naval reserve to H. F. Sinclair, by Albert E. Fall, Secretary of the Interior, in 1922, gave rise, in 1924, to the investigation into alleged oil scandals, by a committee of the Senate.

Legislation. The most important acts of the Legislature in the decade 1914–24 are noted below. The Legislature in 1917 amended the laws relating to elections and passed measures providing for the regulation and inspection of the sale of gasoline and similar products. The Legislature in 1919 passed a measure providing for a budget and made provisions for the eight-hour day on public work. On Jan. 16, 1919, the Federal prohibition amendment was adopted In 1921 the Legislature created the State Farm Board and the State Game Commission. It authorized the Board of Education to promote Americanism as defined by law, and it created the office of Inheritance Tax Commissioner. Measures passed in 1923 aimed to extend the taxing power of the State to mineral, oil, and natural gas mines Activities relating to agriculture were assembled into a single department under a board The hours of labor for women were limited, and child labor laws were amended.

WYOMING, UNIVERSITY OF. A State institution at Laramie, Wyo., founded in 1886. The student enrollment increased from 508 in 1914 to 2061 in the year 1923–24, the faculty from 66 to 85 members, and the library from 35,000 to 60,000 volumes The income during the same period was increased from $192,534 to $804,000 In 1917 the music department building and a small model country school were built. In 1921 additional dormitory facilities for women students were provided by the completion of the last units of Hoyt Hall A central heating plant for the campus was also completed in this year. In 1923 was completed a $200,000 library, started in 1922 At the close of 1923, a $500,000 gymnasium-armory was in process of construction. Aven Nelson, Ph.D., succeeded Clyde Augustus Duniway, Ph.D., LL.D., as president in 1917, and was succeeded in turn by Arthur Griswold Crane, Ph.D., in 1923.

X RAYS. See CHEMISTRY; PHYSICS; CHEMISTRY, PHYSICAL; ALBERS-SCHÖNBERG, HEINRICH ERNST.

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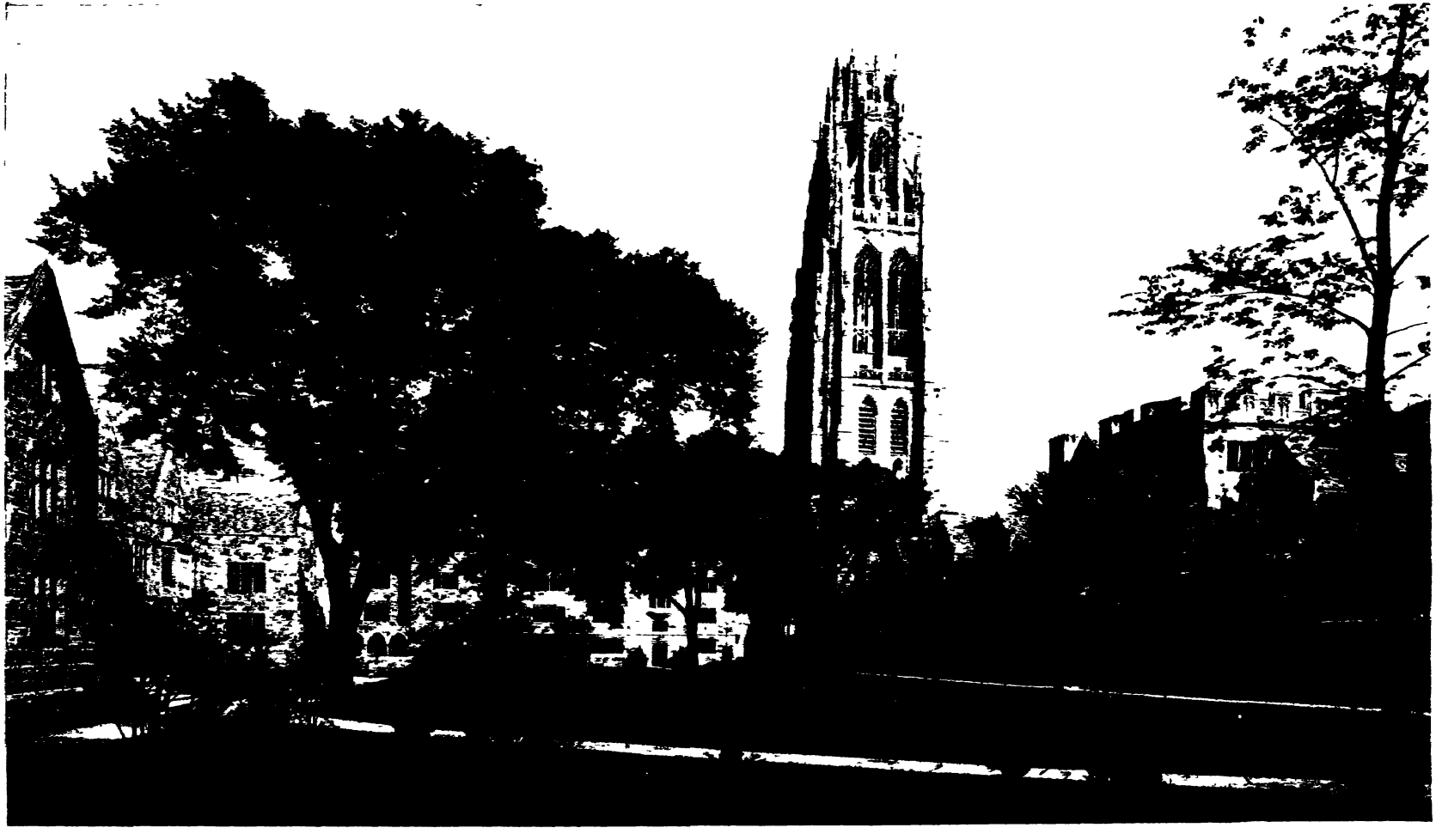
YACHTING. See SPORTS.

YAKUTSK AUTONOMOUS SOCIALIST SOVIET REPUBLIC. See SIBERIA AND FAR EASTERN REPUBLIC.

YALE UNIVERSITY. A non-sectarian institution at New Haven, Conn., founded in 1701. With the exception of the war years, when it dropped to approximately 2000, the student enrollment increased steadily from 3289 in 1914 to 4869 in 1923-24. During the same period the number of faculty members increased from 460 to 645, the library from 1,000,000 to 1,500,000 volumes, and the productive funds from $15,379,363 to $35,764,883. Certain reorganizations in administration were adopted All graduate work not given under the professional schools was concentrated in the Graduate School under four groups of faculties. A common freshman year for both the College and Sheffield Scientific School was established, under a special dean and faculty, and the Sheffield course was lengthened from three to four years and became purely scientific. During the War the only college artillery school in the country was established at Yale, and the largest college naval unit was organized. Important building operations went on during the decade. The Memorial Quadrangle of dormitories for upper classmen, which covers an entire city square and is one of the finest of such groups in the country, was given by Mrs. Stephen V. Harkness in memory of her son. The Sterling Chemistry Laboratory ($2,000,000) and the Sterling Hall of Medicine ($1,500,000) were completed in 1922 and 1923. The laboratory has a saw-tooth factory-construction glass roof over the central part, in which are located the class laboratories where instruction is given in elementary, physical, organic, qualitative, and quantitative chemistry. The industrial chemistry laboratory is two stories high. There are 35 separate research laboratories, accommodating two men each; 12 classrooms; two lecture theatres, seating 150 and 250 respectively; administrative and individual offices: receiving and storage rooms; and a library. The Hall of Medicine, a four-story building extending along two sides of a city block, contains, besides offices of administration, an auditorium and a library, the departments of anatomy, physiological chemistry, physiology, pharmacology, and toxicology. These buildings were erected with part of the large trust fund left by John W. Sterling in 1919 to be used for buildings, scholarships, fellowships, and lectureships, and for the endowment of professorships and the establishment of special funds for prizes. Sage Hall, containing offices and lecture rooms for the School of Forestry, was opened in 1923, and at the close of 1923 the Lapham Field House was under construction. President Arthur Twining Hadley was succeeded in 1921 by James Rowland Angell, Litt.D., LL.D.

YAMANOTO, COUNT GOMBEI (?-). A Japanese naval officer, a member of the Satsuma clan. He was minister of the navy from 1898 till 1906, and premier during 1913-14. The naval scandals coming to light at that time caused the fall of his cabinet. On the death of Baron Kato, in August, 1923, the Prince Regent instructed Count Yamanoto to form a ministry. Its first meeting took place in the open air, in the midst of the smoking ruins made by the earthquake of September 1, and the new government had to take immediate measures to relieve the unprecedented situation. In December, 1923, Yamanoto and his cabinet resigned because of the attempt on the life of Prince Hirohito.

YAP ISLAND. One of the Caroline group of islands, situated in the Pacific north of the equator, and before the War belonging to Germany. In 1916, by a secret agreement with Great Britain, Japan laid claim, in the event of Germany's defeat, to all of Germany's islands north of the equator, while recognizing the British claims to those south of it. On this basis, the Supreme Council on May 7, 1919, allocated the islands north of the equator, including Yap, to Japan as mandatory power, although not without President Wilson's disapproval. The American interest was plain: Yap was nearer the Philippines than any other of the islands; it was, too, an integral point in the American system of communications in the Pacific, for here were to be found stations of the Pacific cable of the Commercial Cable Company from Hawaii, of an American-British cable extending north to the Bonin Islands, and of British lines to the Chinese coast, as well as a wireless station. During 1920 and 1921 the American point of view was repeatedly stressed, to the discomfiture of Japan and Great Britain and to the greater straining of the bonds of the Allied unity. The American contentions centred in the facts that the United States government had served notice during the Peace Conference that it reserved the right to object to exclusive Japanese control of the cable landings, that as the German islands had been ceded to the Allies by the Peace Conference their disposition was a concern of the United States, and that in view of the property interests of other nations, Yap, as far as it was a cable landing station, ought to be internationalized. The Japanese insisted that Yap was theirs by the edict of the Supreme Council and that therefore the administration of the island was their exclusive concern. On Feb. 21, 1921, the American government dispatched to the Council of the League of Nations a note outlining its position and requestiing a reopening of the question. On March 2, the Council admitted the claims of the United States but declared its inability to act, on the ground of the previous decision of the Supreme Council. This, too, represented the opinion of Great Britain and France. The solution of the difficulty rested on the meeting of the Washington Conference. On Dec. 12, 1921, finally, representatives of Japan



YALE UNIVERSITY

BRANFORD COURT, MEMORIAL QUADRANGLE, SHOWING THE HARKNESS MEMORIAL TOWER

and the United States signed an agreement by which the Japanese mandate was recognized by the United States. Japan, on the other hand, accorded the United States free access, on an equal footing with Japanese and other nationals, to the present cable between Yap and Guam and to any other cables which might be laid by Americans; the right to use the Japanese wireless service, and in case of suspension of this right, to build American stations, and freedom of entry and exit for persons and property. On Mar. 1, 1922, the United States Senate ratified the treaty affecting Yap, and the matter was formally closed. The island had an estimated population of 7155. See JAPAN; WASHINGTON CONFERENCE.

YEATS, WILLIAM BUTLER (1865–). An Irish writer (see VOL. XXIII). He was a fervid nationalist and wrote much topical verse, as well as *Responsibilities* (1914) and *Reveries over Childhood and Youth* (1915). In his poetry he tried to carry out Synge's idea of the poet as one who "uses the whole of his personal life as his material" His poems are therefore very imaginative and individual. His *The Wild Swans at Coole* (1917) reveals his interest in esoteric doctrine; *Michael Robartes and the Dancer* deals with the Ireland of 1916. He was one of the first in England to appreciate the poems of Rabindranath Tagore. Another Oriental preoccupation was the "Noh" drama of Japan Under Japanese influence he wrote *At the Hawk's Well* (1917) and *Two Plays for Dancers* (1919). He was deeply interested in the little theatre movement in Dublin, and worked for an aristocratic theatre for a small audience modeled somewhat on the "Noh" drama of Japan

YELLOW FEVER. Knowledge and control of this affection were much advanced during the decade 1914–24. In 1918 the foci of the disease were limited to Ecuador and Guatemala. The outbreak in Guatemala was serious, with 550 cases and 200 deaths, but the disease was soon stamped out by the local health authorities in cooperation with the United States Public Health Service. At the same time the Rockefeller Foundation sent Dr. Noguchi to study the cases of the disease at Guayaquil in Ecuador; in 1917 this was the only active focus of the disease in the entire world, prior to the Central American outbreak. In 1920 the Rockefeller Foundation formally announced that Dr. Noguchi's discovery of the exciting cause of the disease, a spirochæte, the *leptospira icteroides*, had led to the preparation of a preventive and curative serum. Already people going into yellow fever districts were being immunized in the Broad Street Hospital in New York City. The disease was stamped out in South America, and in 1919 the world was for a time entirely free from it. In 1920 it broke out anew in Yucatan, and Dr. Noguchi was sent to the infected area. Several shipments of the Rockefeller vaccine were also forwarded. Specimens of the spirillum culture were sent from Yucatan to Havana for study, and it was ascertained that the dog can be inoculated with a disease which closely resembles human yellow fever. In 1921 Dr Howard Cross, who was to have taken charge of the bacteriological laboratory at Vera Cruz, fell a victim to the disease.

YEMEN. See ARABIA.

YERKES, ROBERT MEARNS (1876–). An American experimental psychologist (see VOL. XXIII). He was the organizer of the psychological tests for the United States Army during the War. In 1915 he had prepared a point scale for mental ability, and it was this scale rather than the Binet mental-age tests which was found practicable for the stupendous task of cataloguing the abilities of more than 1,000,000 men. Major Yerkes edited the publication of the test results under the titles, *Army Mental Tests* (1920) and *Psychological Examining in the United States Army* (1921). He also edited a volume on *The War and Science* (1920). In 1919 he became chairman of the Research Information Service of the National Research Council, an endowed organization for the promotion of scientific studies. See MENTAL MEASUREMENT.

YON, PIETRO ALESSANDRO (1886–). An American organist and composer, born at Settimo Vittone in Piedmont. At the age of six he began his musical studies with A. Burbatti at Ivrea. In 1900 he entered the Conservatory at Milan, but winning a scholarship in the following year at the Conservatory in Turin, he continued his studies there under da Venezia (piano), Redmondi (organ), and Bolzoni (composition). He then attended for one year the Accademia Santa Cecilia in Rome, where his teachers were Bustini and Sgambati (piano), Renzi (organ), and de Sanctis (composition). He graduated in 1905 as winner of the first prize and of a medal awarded by the Minister of Public Instruction. From 1905 to 1907 he was assistant to his teacher Renzi, organist at St. Peter's, and even then his recitals began to attract attention. In 1907 he settled in New York as organist at St. Francis Xavier's. Frequent and extensive tours of the country soon established his reputation as one of the greatest living organists. In 1921 he was honored by the appointment of honorary organist at St. Peter's in Rome. This was the first time that this distinction had been conferred. His works consist of 17 masses; *Concerto Gregoriano* for organ and orchestra; a concerto for oboe and orchestra; brilliant organ compositions, mostly in larger forms; motets (a cappella and with organ); piano pieces; and songs.

YOUNG, ALLYN ABBOTT (1876–). An American economist, born in Kenton, Ohio, and educated at Hiram College and Wisconsin University. During 1902–06 he taught economics at Wisconsin, Western Reserve, and Dartmouth Universities and then became professor of economics at Stanford. In 1911 he accepted a call to a similar chair at the University of Washington and two years later went to Cornell, where he remained until 1920, when he was called to Harvard. During the War he was director of the bureau of research of the War Trade Board and then was chief of the division of economics and statistics of the American Commission to Negotiate Peace. In addition to many articles and papers on economic subjects, he was one of the authors of *Outlines of Economics* (1908, 1916).

YOUNG, JOHN WESLEY (1879–). An American mathematician, born in Columbus, Ohio, and educated at Ohio State University and at Cornell During 1902–03 he was an assistant at Cornell; during 1903–05 he was at Northwestern University, after which he served at Princeton (1905–08). During 1908–1910 he was head of the department of mathematics at Kansas University; he was then called to Dartmouth,

where he has since remained. Algebra and geometry have been the subjects of his special studies. He was editor of the *Bulletin of the American Mathematical Society*, on whose council he has served since 1911, and in 1918 he was vice president of the Mathematical Association of America. In addition to many papers on his specialties he is the author with O. Veblen of *Projective Geometry* (1910); *Lectures on Fundamental Concepts of Algebra and Geometry* (1911); with A. J. Schwartz, *Plane Geometry* (1915); with F. M. Morgan, *Elementary Mathematical Analysis* (1917); and *Plane Trigonometry* (1919).

YOUNG, Levi Edgar (1874–). An American educator, born at Salt Lake City, Utah, and educated at Utah, Harvard, Strassburg, and Columbia Universities. From 1900 he was professor and head of the department of western history at the University of Utah. Professor Young lectured widely in American universities on the history of that State. He was a member of many historical and scientific societies and of the First Council of 70 of the Church of Jesus Christ of Latter-Day Saints. He wrote *History of the Mormon Tabernacle* (1918) and *The Story of Utah* (1920).

YOUNG, Mahonri (1877–). An American sculptor and etcher, born at Salt Lake City, Utah. He is a grandson of Brigham Young. He studied at the Art Students' League, New York City, and the Julien Academy, Paris. He was for some years instructor in drawing at the Art Students' League and more recently at the American School of Sculpture. He is known chiefly for his figures of laborers, usually small in size, but depicted in an interesting and virile manner. Among his best known works are "Man with Pick" (Metropolitan Museum, New York); Hopi and Apache groups, in the Museum of Natural History, New York; "A Laborer" and "The Rigger," Free Public Library, Newark, N. J., and the sea gull monument in Salt Lake City. He is a National Academician (1923) and a member of the National Sculpture Society.

YOUNG, Owen D. (1874–). An American lawyer, born at Van Hornesville, N. Y., and educated at St. Lawrence University and the law department of New York University. In 1896 he began the practice of law. He was director and official of many important corporations. In 1924 he was appointed by the Reparation Commission as one of the members of the American delegation to investigate the financial condition of Germany. He was credited with having been largely responsible for the Dawes Report.

YOUNG, Stark (1881–). An American author, born at Como, Miss., and educated at the University of Mississippi, where he taught English from 1904 to 1907. He afterward taught English at the University of Texas and at Amherst College. His writings include: *The Blind Man at the Window*, verse (1906); *Guenevere*, a play in verse (1906); *Madretta Addio, The Twilight Saint, The Seven Kings and the Wind, The Queen of Sheba, The Dead Poet*, and *The Star in the Trees*, one-act plays in prose and verse (1911); *Three Plays* (1919); and *The Three Fountains* (1924), a book of colorful sketches with American and European settings.

YOUNG MEN'S CHRISTIAN ASSOCIATION. This movement, having national organizations in 30 countries, showed extraordinary growth and activity during the decade 1914–24. It received great impetus abroad, particularly in Europe, mainly as a result of the war work of the North American Associations. The work of the Y. M. C. A. was extended to the new states of Poland, Czecho-Slovakia, Latvia, and Esthonia, as well as to Greece, Rumania, and Portugal. Europe gained nearly 400 local associactions in the postwar period up to 1924. Others were established in Turkey, Palestine, and Egypt The world total in 1924 was nearly 9000 associations, with more than 1,500,000 members. The Association conducted nine-tenths of the welfare work among the American forces in Europe during the War. Alone among American welfare societies, this organization administered to not less than 19,000,000 of the soldiers of the Allies' armies and extended its help to more than 5,000,000 prisoners of war. The American Y. M. C. A. service in the War actually began in 1914, with work in the prison camps of the opposing forces and with the Allies' armies in France and the Near East. With America in the conflict, work was started in home training camps, all army and navy stations, on troop trains, at ports, and on transports Twelve hundred army and 49 navy associations were operated in the United States. Over $61,000,000 was expended for free welfare service for the American Expeditionary Forces alone. A total of 25,925 men and women served with the American Y. M C. A. in various phases of war work abroad and at home. In 1917 there were gathered in officers' training camps those who were to be junior officers To these camps the Y. M. C. A. sent some of its foremost physical directors for athletics and games After the Armistice athletics proved of extraordinary service, and the interest in them led to the building of the Pershing Stadium and the holding there of the inter-Allied games The Association conducted an immense banking business for the fighting men overseas who placed $21,558,339 with it for transmission home. Of the 351,468 remittances sent through it from overseas, only 41 remained undelivered.

The Y. M. C. A. operated 1397 stations in France before the Armistice and 2009 in the following winter during the period when the soldiers were waiting to go home Leave areas and recreation centres at 47 towns in France, Germany, and England were also operated. The operation of the post exchange or canteen was undertaken by the Y. M. C. A. at General Pershing's request so that the army would be freer for training and fighting. The work was carried forward on the basis laid down in official orders, except that the Association did not include operating costs in the expenses. The total turnover was $37,800 000. A remission by the American and French governments on transportation charges enabled the Association to hand $500,000 to the American Legion to be used at its discretion. The Community Motion Picture Bureau, maintained and operated by the Y. M. C A., supplied all American welfare organizations overseas with films. The funds and management of the Over There Theatre League, for which 1500 professional men and women entertainers were recruited, were furnished by the Y. M. C. A., and four "play factories" were set up. At the height of its activities there were 700 soldier shows and 200 soldier actors in the organization. For the Army of Occupation in Germany, the Y. M. C. A. opened 425 centres, with

service by rolling canteens at 83 out-stations. This work brought from Major-General Allen, commanding the Army of Occupation, the statement that "soldier welfare service never before reached the high standard maintained here." The service from 1917 to 1920 was directed by the National War Work Council, composed of some 200 business and professional men. Its chairman was William Sloane, and its budget and finance committees were headed by Cyrus H. McCormick and George W. Perkins. To this Council the American people committed about $167,000,000. Expenditures of $155,000,000 were reported when the Council disbanded, and the remaining funds were distributed for work with the army and navy, scholarships for ex-service men, work with the armies of the Allies, prisoners of war, and refugees, and a reserve for needs of soldiers and sailors in a national emergency.

From the end of the War to 1924, the Y. M. C. A. furnished educational assistance to more than 100,000 ex-service men studying in colleges, technical, and correspondence schools. Under the Y. M. C. A. Educational Commission, 900,000 soldiers studied in army schools, 6300 at French universities, and 1956 at British universities. The Association worked among the Czecho-Slovak troops who fought their way across Russia and Siberia to Vladivostok to their homeland. It cared for thousands of prisoners gathered in Siberia awaiting transport. It aided Russian prisoners to get back into Russia from Germany and France, and later it carried on refugee work among those who fled before the Bolshevist advance. It opened associations, at governmental request, for the soldiers of Portugal, Poland, Rumania, Czecho-Slovakia and Greece. The Student Relief movement, growing out of economic distress in Europe, has enlisted the activity of the Y. M C. A. in many lands. In 1923 was published a two-volume history of the war work of the Association, called *Service with Fighting Men*, with Ex-President Taft as editor-in-chief. In the same year the World's Conference for Y. M C. A. Workers Among Boys was held at Portschach in Austria, with delegates from 53 countries present. In 1923 also, the associations in America, all of which are self-governed, and which coöperate for national and international service through the agency of the International Committee, formulated a constitution which was ratified by referendum vote in 1924. It provided for an elective National Council, with legislative and elective powers, to supervise their joint activities, and to take over most of the functions discharged by the International Committee since 1857. State committees and agencies are integrated with national under the new plan, which was to become effective in 1925. The national agency under this plan would continue to assist the local associations with research and advice.

The Association's year in 1923–24 revealed an appreciable gain in nearly every department of its work. Official data available on 1693 Y. M. C. A.'s in the United States and Canada show the year to take rank with, and in several important directions to exceed, the record year of 1921. The total membership of the reporting associations is 988,522, a gain of 9.5 per cent over 1922–23. Marked increases were also reported in the number attending Bible classes and camps. The Building Bureau of the International Committee is retained on some 75 building projects. Both railroad work and industrial work were broadened. Endowment funds increased by 8.3 per cent, to $17,308,000, while the property debt increased only 6.6 per cent. An increase of net Association property to $159,521,000 (8.1 per cent in the year) indicates the volume of property additions and is believed to mark the end of the deflation period of 1922–23. There were 359 student associations operating in professional schools and colleges, with a total membership of 76,413. Industrial associations in 2086 plants had 176,767 members. The 34 army, navy, and army and navy stations located at various points in the United States, Hawaii, the Philippines, and China had an average daily attendance of 1117. Service to boys from 12 to 18 years of age was greatly extended. These boys constituted 25 per cent of the entire Association membership in 1924. Hi-Y clubs, formed in High schools, numbered 2064 and had a total membership of 59,000. In foreign countries other than in Europe service was being carried on by 384 associations related to the American movement. These associations had a total membership of 125,000.

YOUNGSTOWN. A city of Ohio, the second largest steel centre in the United States. The population increased approximately 60 per cent, from 83,044 in 1910 to 132,358 in 1920, and to 155,000 by local estimate in 1924. The city government was changed in 1924 to the federal form under home rule. A city planning and zoning system was inaugurated, controlling the height of buildings, parking districts, building lines, etc. The Butler Art Institute was built at a cost of $2,000,000, additional libraries and high schools and the Youngstown School of Technology were opened, and the Stambaugh Memorial Auditorium, to cost $5,000,000, was under way in 1924. Three and a half miles of railroads, providing facilities for the placement of 500 additional industries, and new railroad terminals were constructed; the city transit system came under municipal control on a service-at-cost franchise. The capital invested in manufacturing increased from $123,000,000 in 1915 to $350,000,000 in 1923, and manufactured products rose in value from $92,111,000 in 1914 to more than $300,000,000. Bank clearings, from $76,422,340, became $221,883,443.

YOUNG WOMEN'S CHRISTIAN ASSOCIATION. The branches of the Young Women's Christian Association of the United States are united under a national board, with headquarters at 600 Lexington Avenue, New York City. Its work, during the decade 1914-24, was of the greatest importance. In 1916 the Association had 11 field committees and a staff of 128 headquarters and field secretaries. These promoted such specialized activities as visiting and teaching immigrant women and girls, helping young business women by vocational guidance, establishing club houses for nurses and art students, offering opportunities to colored and Indian students, and interesting women in philanthropic and religious work. The membership in 1916 was 364,673. Immediately following the entrance of the United States in the War in 1917, the Association appointed a War Council and entered on an active campaign in the interest of girls and women in the War. Features of this work were the erection of hostess houses in the army camps throughout the country, emergency

housing for girls employed in military and industrial centres, the formation of the Patriotic League for younger girls and club and recreation centres for colored and white women, and work with foreign-born women in the United States. The Association also instituted industrial clubs for the women of France and Russia and organized social centres for American nurses in France. A war fund of $5,000,000 was raised in 1917–18. By the end of 1918 nearly 100 hostess houses had been organized and built at a cost of nearly $2,000,000 in camps throughout the United States. The Girl Reserves organized by the Association had a membership of 445,300 with 774 units in 47 States A housing committee rented or built vacation houses, dormitories, cafeterias, and hostels in 11 centres for women in industry, at a cost of more than $500,000. In France, 15 hotels and social centres were in operation, 21 huts for nurses in base hospitals, and 18 centres for the French workingwomen. Work in France was carried on for the welfare of women specifically. The Association undertook cemetery work in France, and for the benefit of women who went to France to visit the graves of their soldier dead, centres were provided in 1919 at large American cemeteries Work was maintained during the year in Czecho-Slovakia, Poland, Italy, Russia, Belgium, Rumania, the Near East and elsewhere. The overseas budget for 1917 was $4,128,145. In 1920 the Association had 59 centres in Europe and the Near East, with 118 secretaries; and in the Orient and South America, 32 centres with 118 secretaries. During 1920 the board conducted 40 10-day summer conferences for girls, with a total attendance of 10,840; in 1923 it had 42 with an attendance of 10,581. Under the Continuation Committee of the National War Work Council, there was maintained, during 1921–22, certain war work of postwar significance This was financed from the balance of sums originally appropriated for this work from war work funds. In 1924 the Association had a membership of 545,000. Its real estate was valued at more than $40,000,000, and the gross budgets of the local associations amounted to approximately $25,000,000. Aggressive work continued in its domestic and foreign branches during 1923. The Association has an official monthly publication.

YPRES, Battles of. See War in Europe, *Western Front.*

YSER, Battles of the. See War in Europe, *Western Front.*

YUDENITCH, Nikolai (1862–). A Russian general, educated at the General Staff College. He saw service in Turkestan and in the Russo-Japanese war and acquired a high reputation and gradually rose in rank At the beginning of the War he rendered great service to the Allied cause as commander of Russian forces in the Caucasus, and when in 1917 the revolution caused a complete breakdown of Russia's military organization, Yudenitch by a masterly retreat succeeded in extricating his men from a difficult position. From the Baltic provinces in 1920 he attempted to overturn the Soviet régime but was defeated.

YUGOSLAVIA. See Jugo-Slavia.

YUKON. A territory of the Dominion of Canada, bordering on Alaska. Total area, 207,076 square miles. Population, in 1921, 4157 (1911, 8512; 1901, during the gold boom, 27,219). Capital, Dawson City, with a population of 975 in 1921, as against 3013 in 1911. Mining was the chief occupation. The gold mined from 1885 to 1918 amounted to $198,000,000. In 1922 the gold output was 54,456 ounces, valued at $1,125,705 Other minerals produced in the latter year were silver, lead, and coal; copper production was not reported after 1920. In 1921, the total mineral production was valued at $1,929,000. The fisheries continued to be of some importance. There were 16 fur farms in 1921. Prior to 1920 the Yukon was governed by a gold commissioner and a territorial council of 10 elected members. After that date the membership of the council was reduced to three.

Z

ZAGHLUL, SAAD PASHA (1856–). An Egyptian premier, born at Ibian in the province of Gharbia, and educated at the university at El Azhar, founded by the great Saladin. In 1884 he began to practice law, and in 1892 he was appointed councillor of the Court of Appeal. In 1906 he became an able minister of education. As a prominent member of the Nationalist party, after the signing of the Armistice in 1918 he asked for recognition of Egyptian independence. He based his appeal on the self-determination policy which the British government had followed with regard to other countries liberated from Turkish rule. When he was not allowed to go to London to urge this cause, he and his friends exhibited so hostile an attitude that they were arrested and deported to Malta. This action aroused the country, and many were killed in the subsequent outbreaks. Zaghlul was released after a time and finally was allowed to go to London. When he returned in 1921, however, he was again arrested and deported to Ceylon. On Feb 28, 1922, the British declared Egypt independent, except for certain "reserved points" Zaghlul and his followers demanded complete independence, and in the election of January, 1924, they received a large majority. Zaghlul was made premier on Jan. 28, 1924.

ZAHN, ERNST (1867–). A popular Swiss novelist (see VOL. XXIII). His later publications include: *Einmal Muss wieder Friede Werden* (1916); *Stephan der Schmied* (1917), translated into English in 1920; *Die Mutter* (1917); *Schweizer* (1920); *Lotte Esslings Wille und Weg* (1921); and *Das Licht* (1922).

ZAIMIS, ALEXANDER. See GREECE.

ZANGWILL, ISRAEL (1864–1926). A British author (see VOL. XXIII). He was very active as a speaker and lectured in Great Britain and Ireland, Jerusalem, Holland, and the United States. During the War he was a pacifist. His attempt to combine all the Jewish organizations in a plan to secure the Highlands of Angola as the Jewish national home was unsuccessful, and he later declined to work with the Zionists when the British government supported a plan to set apart Palestine for the Jews. He published *Too Much Money* and *Chosen Peoples* (1918); *Jinny the Carrier* (1919); *The Voice of Jerusalem* (1920); and *Ibn Gabriol's Poems*, from the Hebrew (1923). He also produced the plays, *The Cockpit* (1921) and *The Forcing House* (1922).

ZANZIBAR. A British protectorate of East Africa comprising the island of Zanzibar (640 square miles), the island of Pemba (380 square miles), and several islets. The population of the protectorate was estimated at some 197,000. By the 1921 census there were 24,125 inhabitants not native, including 270 Europeans, 10,000 Arabs, and 12,900 British Indian subjects. Zanzibar town had 35,000 inhabitants. Cloves and copra continued the most important articles of trade. Others were rice and grain, ivory, and raw cotton, all of which entered into the transit trade. Exports steadily mounted; their values in 1913, 1921, and 1922 were £1,048,366, £3,246,405, and £3,045,600. Imports similarly showed increases; their values for 1913, 1921, and 1922 were £1,103,348, £3,223,295, and £2,844,200. Leading articles of import were cotton piece goods, rice and grain, sugar, motor spirits, and petroleum. Of the total trade in 1922, 25 per cent was with India and Burma, 20 per cent with Tanganyika Territory, 14 per cent with the United Kingdom, and 5 per cent with the United States. Imports from the United States in 1922 (1913 figure in parentheses) were worth £52,407 (£28,796), and exports to the United States were £142,163 (£48,317). In 1913, 1,502,920 tons entered; in 1922, tonnage was 788,638. Of late years, the importance of Zanzibar port as a point of transhipment and as a distributing centre decreased, owing to the development of the mainland, the establishment of direct steamer communication between coast ports and Europe, and the growing importance of Aden. The local traffic was retained. Revenues increased from £275,126 in 1913 to £445,594 in 1923 (estimate). For the same years expenditures were £248,000 and £545,121 (estimate). The public debt at the end of 1921 was £100,000. In July, 1913, control over the affairs of the protectorate was vested in the Colonial Office. The reigning sultan, Seyyid Khalifa bin Harud, whose influence over the natives of East Africa was great, aided considerably in keeping the country well disposed toward Great Britain during the War.

ZAYAS, ALFREDO. See CUBA.

ZECKWER, CAMILLE (1875–1924). An American composer, born at Philadelphia. He received his early training from his father at the Philadelphia Musical Academy, then studied for two years (1893–95) under Dvořák at the National Conservatory in New York, and later under Scharwenka in Berlin. In 1915 he became director of the Germantown branch of the Philadelphia Musical Academy. In 1922 he was the first recipient of the newly established $1000 prize awarded annually at the North Shore Festival (Evanston, Ill.). His works include a symphonic poem, *Sohrab and Rustum; Jade Butterflies* (North Shore Festival prize); *Swedish Fantasy* for violin and orchestra; a piano concerto; a piano trio, a piano quartet, a piano quintet, a string quartet, and two violin sonatas; *Sérénade Mélancolique* for violin, 'cello, and piano; *The New Day*, cantata for soli, chorus, and orchestra; piano pieces; choruses; and songs. A three-act opera, *Jane and Janetta*, had not yet been produced in 1924.

ZELENY, CHARLES (1878–). An American zoölogist, born at Hutchinson, Minn., and

educated at the University of Minnesota and the University of Chicago. He was instructor in zoölogy (1904–05), assistant professor (1906–07), and associate professor (1907–09) at the University of Indiana; and assistant professor of zoölogy (1909–10), associate professor (1910–15), and professor (1915–) at the University of Illinois. His published work was mainly on regeneration and experimental embryology.

ZELENY, JOHN (1872–). An American physicist, born in Racine, Wis., and educated at the University of Minnesota and at Berlin and Cambridge. During 1892–96 he was instructor in physics at Minnesota, where he was professor (1908–15) and acting dean of the graduate school (1912–13). In 1915 he was called to the chair of physics at Yale, where he has since remained. Among his original investigations are studies on the conduction of electricity through gases, properties of ionized gases, electrical discharges from liquid surfaces, and propagation of smell.

ZEMSTVOS, ALL-RUSSIAN UNION OF. See RUSSIA, *History.*

ZEPPELIN AIRSHIPS. See AËRONAUTICS.

ZIMMERMANN, ARTHUR (1859–). A German statesman, born at Frankenstein. He entered the Foreign Office in 1902 in a subordinate capacity and in 1910 was made director of the political section. In November, 1916, he became secretary of state and as such attempted to incite Mexico to an attack on the United States and suggested that Mexico should be rewarded by the gift of New Mexico, Texas, and Arizona. Disclosures concerning his activities and those of Bethma-Hollweg caused the downfall of the latter, and Zimmermann was forced to retire on Aug. 5, 1917.

ZINC. In the period between 1914 and 1924 the zinc industry passed through several interesting phases, particularly in the United States, where for a time there was an extraordinary development in production. In 1870 the United States produced about 7000 tons of zinc, but by 1917 its output was almost 100,000. With that amount attained, both the mining and refining of the metal were placed on a highly efficient basis. In the United States there are three principal kinds of zinc ores: first, the zinc lead ores of the Missouri, Kansas, and Oklahoma regions, found in an area of some 3000 miles, located at the point of intersection of these three States, and also the zinc-lead ores of Wisconsin; secondly, the remarkable mine of the New Jersey Zinc Company; and thirdly, the mixed ores, chiefly zinc-copper and zinc-lead, of the Rocky Mountains. It is in this field that the most important new metallurgical developments were made, for practicable methods were devised for concentrating, roasting, and leaching zinc-copper ores and producing zinc from solution by electrolysis; the residues were treated for their copper content. The zinc electrolytic plant of the Anaconda Copper Company at Great Falls, Mont., had in 1924 a capacity of 150 tons of zinc per day, while the Butte and Superior Company, which was the largest individual zinc-producing mine in the United States, concentrated its ores by flotation and then roasted and smelted the concentrates in retort furnaces. The ore handled by this plant was from 10 to 30 per cent zinc, and in 1916 this mine produced 90,000,000 pounds of zinc.

Inasmuch as most of the zinc is utilized for brass, which was extensively required for munitions during the War, it was inevitable that the demand for zinc should be stimulated by the great contest. Early in the War the German armies occupied the zinc-smelting region of Belgium, so that a large fraction of the world's zinc-smelting capacity was eliminated at a time when this metal was most needed. Accordingly the demand for zinc became urgent in the United States, and the price rose to the point where large profits could be made in working the various deposits and smelting the ores.

Notwithstanding increased costs, due to high wages and prices of materials, the scale of operation of American zinc mines and smelters increased, and new companies were started, so that where zinc production in the United States amounted to 353,000 tons in 1914, it increased in 1917 to 669,573 tons. In the mid-continent field natural gas was used, and the new plants, although hastily constructed, involved important metallurgical improvements. Beginning with 1906, zinc ore was imported into the United States for smelting; considerable zinc concentrate was brought to the United States from Australia in 1916. Over 100,000 tons of zinc were made from imported ores smelted in the United States, but by 1918 the production of zinc from foreign ores had declined to 25,000 tons, and by 1921 it amounted to only 2268 tons out of a total production of 218,093 tons.

The zinc industry was also a source of sulphuric acid from the zinc sulphate concentrates, which had to be roasted to convert them to

ZINC PRODUCED IN THE UNITED STATES, 1922 AND 1923
United States Geological Survey
(In short tons)

	1922	1923
Arkansas	13,627	29,870
Illinois	76,266	93,239
Kansas	24,167	32,006
Oklahoma	74,537	119,744
Pennsylvania	57,319	82,003
Other States	52,992	82,484
Electrolytic	55,369	71,088
Total primary	354,277	510,434
From domestic ore	353,274	508,335
From foreign ore:		
Australia	....	....
Canada	55	...
Chile	.	.
Mexico	948	2,099
Total foreign	1,003	2,099
Total primary	354,277	510,434
Redistilled secondary	32,988	39,900
Total	387,265	550,334
Grade A	67,459	90,082
Grade B	36,402	58,636
Grade C	49 980	90,459
Grade D	233,424	311,157
Total	387,265	550,334
Average selling price per pound	Cents	Cents
Grade A	6 0	7 1
Grade B	6 0	7.1
Grade C	5 6	6 7
Grade D	5 6	6 7
All grades	5 7	6 8
Total value of output	$44,148,000	$74,845,000
Zinc dust		
"Atomized"	3,859	4,376
"Blue powder"	3,394	3,676

oxide for further treatment. The sulphur dioxide used in this process is commonly converted into sulphuric acid. While most of the zinc produced is utilized in the manufacture of brass, nevertheless the decade 1914–24 saw a considerable increase in the manufacture of rolled and sheet zinc; the latter is manufactured for roofing and also for boxes and various stamped articles, such as jar tops, etc. In addition to the metal there was also a normal increase in the consumption of zinc oxide, through its extensive use in the manufacture of automobile tires, as well as in the more general use of zinc pigments, especially in enamel paints Zinc chloride is used by railroad companies, for the preservation of ties, and by other consumers of timber. The quantity of zinc oxide sold in 1923 was practically the same as in 1922, although the price increased about 5 per cent. The sale of lithopone, on the other hand, showed an encouraging increase, nearly 18 per cent, and an increase in price of 7 per cent

ZINOVIEV, Grihori Ovsei Gershon Aron (1883–). A Russian revolutionary politician In 1907 he attended the London conference of delegates of the Russian Social Democratic Labor party, of which he was an active member. In 1908 he served a term in prison for his revolutionary activities, but in 1909 he made his way abroad and edited *The Social Democrat*, chief organ of his party. After the revolution, Zinoviev became a member of the Petrograd Soviet and in 1918 its president. The newspaper *Den* charged that he had been a police spy, and this was never refuted, yet he advanced and became the first president of the Third (Communist) International He was also president of the Petrograd Extraordinary Commission for combating counterrevolution. As a member of the Cheka (Central Committee) he took a leading part in the effort, begun in 1924, to obtain more freedom of judgment and action within the ranks of his party.

ZIONISM. The outbreak of the War ended the gradual influx of Jewish settlers into Palestine and cut off the funds which had enabled them to maintain themselves and their institutions. The Jewish population, which had reached 100,000 in 1914, began gradually to diminish because of emigration. A Provisional Committee for Zionist affairs was hurriedly organized in America under the chairmanship of Louis D. Brandeis to prevent the disintegration of the settlements already made in Palestine and to assist the settlers until the ending of hostilities In the meantime an intensive propaganda was instituted among American Jews in the effort to raise sufficient funds to compensate for the complete breakdown of the Zionist organization in Europe. In 1916 conversations began between the leaders of the Zionist organization, headed by Dr. Chaym Weitzman, a Russian-born Jew, who had attained a position of prominence in the University of Manchester (England), and the leaders of the British government, relative to the creation of an autonomous Jewish settlement in Palestine. Actuated by the double motive of winning the united sympathies of the Jews for the Allied cause and the creation of a friendly population in Palestine, which borders on the Suez Canal, Lord Arthur Balfour, in November, 1917, declared the attitude of the British government toward Zionism favorable. A special Jewish battalion was organized under the leadership of Col. John H. Patterson to assist in the reconquest of the Holy Land. Shortly after the issuance of the Balfour Declaration, it aided in the capture of Jerusalem. A Zionist Commission was sent to assist the British authorities in the administration of the Jewish homeland In the meantime preparations were begun for creating a large Jewish university on Mt. Scopus, where the language of instruction was to be Hebrew, which had been revived by the incoming settlers.

In 1920, in London, the first Zionist Congress after the War was held Plans were drawn up for the reorganization of the Jews of the world for work in Palestine and for the raising of a fund, called the Keren Hayesod, to begin the work of financing the new settlements. The Balfour Declaration, originally an enunciation of the policy of Great Britain only, was ratified by the Allied statesmen at the Conference of San Remo and in 1922 by the League of Nations. These two decisions marked the stabilization of the Zionist political position and the beginning of a period of intense activity In the summer of 1921 Sir Herbert Samuel, an English Jew of Zionist sympathies, was appointed by the Lloyd George government to the position of High Commissioner of Palestine with the responsibility of maintaining the rights of the various contending parties. Jewish immigrants, chiefly from eastern Europe, at the rate of 1000 a month, were beginning to enter the country, they were financed by the International Zionist Organization. In the meantime a break occurred between the adherents of Judge Louis D. Brandeis in America and those of Dr Weitzman. The official organization, however, remained under the control of the international leaders. In the latter part of 1923 serious work was begun for the extension of the responsibility for the rehabilitation of Palestine, which was borne almost entirely by the Zionist organization and by Baron Edmond Rothschild of Paris. In accordance with the terms of the British mandate, a Jewish Agency was to be organized for the inclusion of Jews who were not members of the Zionist organization. In the early part of 1924, under the leadership of Louis Marshall of New York City, foundations for this agency were laid, as well as for the unification of all Jewry in the work of rebuilding Palestine. During this period the influx of Jewish settlers began to make its mark on the country The cultivation of tobacco was begun; large tracts of land were bought from the Arabs for purposes of cultivation. A number of new schools and cultural institutions and even a Hebrew opera were created. The Rutenberg scheme for the electrification of the country made much progress, and the model township of Tel-Aviv boasted an entirely Jewish population of 20,000 and all modern conveniences. The total Jewish population was in 1924 estimated at 100,000. With the additional funds coming from the new Jewish agency the increase of the Jewish population was expected to be about 20,000 per annum. See Palestine; Jews and Judaism.

ZIPS. See Teschen, Zips, and Orava Questions.

ZONING. See City Planning.

ZOÖLOGY. Since Neolithic man had a considerable number of domesticated animals, it may be said that the study of zoölogy began very early in the history of man, and during the following centuries he must have accumu-

lated considerable information concerning the structure and habits of the animals which he encountered. Of these earlier observations, naturally, no records are preserved except insofar as they became incorporated in the folklore and tribal histories of the race, and zoölogy as a science begins with the work of Aristotle (384–322 B.C.) in his *History of Animals*. This *History* is a compilation of what was known about animals up to that time combined with the results obtained by the large number of field naturalists whom Aristotle was able to employ through the financial assistance given him by Alexander the Great. In addition, and this gives the *History* the character of something more than a mere compilation of information, Aristotle attempted a classification of animals, in which he arranged them in groups based on their structural agreements and differences.

In the following centuries zoölogy shared in the fortunes of the other sciences, showing advances when freedom of thought and investigation were allowed, and a degeneration into mere repetition of traditional dogmas when, as in the Dark Ages, conditions were unfavorable for independent investigation. During most of this time, zoölogy was closely bound up with medicine; anatomy was of much importance to physicians, and many important advances in zoölogy were made by physicians. Much of historical interest occurred during this interval, and by the middle of the eighteenth century a considerable body of information had been accumulated, but this was in a very chaotic condition Notable as the first successful attempt to reduce these facts to some order is the work of Linnæus (1758) to whom we largely owe the concept of a "species," as well as the system of nomenclature for species universally employed since then. The Linnæan concept was that at some time in the past there were independently created pairs of individuals, male and female, differing from all other animals in certain definite structural characteristics, and that the descendants of each pair retained from generation to generation the essential specific characters given to their first parents at the time of their creation. Linnæus noted further that the differences between species are not uniform but greater in some cases than in others; the dog and the fox, for example, resemble one another much more closely than either resembles a cow; so it is possible to arrange species into groups of a higher order, the species in each group resembling one another more than they resemble species in any other group. Each of these higher groups he called a genus. According to Linnæus, this grouping of individuals into species and of species into genera was a part of the original plan of creation. For convenience of reference, he proposed to give every animal a double name, of which the first word should indicate the genus, the second the species, to which it belongs. Thus the scientific name of the dog, *canis familiaris*, indicates that it belongs in a genus *canis* to which also belong the fox and the wolf, while its structural differences from them is indicated by its assignment to a distinct species, *familiaris*. This "binomial" system proved to be a tool of the greatest importance for the zoölogist, and in the century following Linnæus an immense number of genera and species were described and named. On the assumption that each of these species represented a distinct act of creation, this recognition and description seemed a sufficient end in itself.

The next date to be considered is 1859, when Darwin published *The Origin of Species*, and the universal acceptance of the evolution hypothesis which followed completely revolutionized zoölogy. Belief that animals have a blood relationship to one another naturally made the recognition of boundaries between species seem of less importance, and taxonomy, or the classification of animals, accordingly fell more or less into disrepute, while morphology, combining the study of adult structure with the embryonic history of the individual, became the chief line of investigation. (See below, *Embryology*)

The next important change in the point of view of the zoologist was the development of the experimental method. No precise date can be assigned to the beginning of this development, but during the last two decades of the nineteenth century and through the first quarter of the twentieth, there has been an increasing use of this method, so that from being largely an observational science zoölogy is rapidly becoming experimental. New fields of research have been opened up, each demanding its own special technique, its own vocabulary, and in many cases its own special journals, so that at the present time few zoölogists are able to claim intimate acquaintance with more than a very limited portion of the field. Points of contact have also been established with other sciences. The zoölogist interested in the study of heredity finds that his interests lie very close to those of the botanist working along the same lines, and he is apt to affiliate with the latter rather than with zoölogists in general; this new affiliation he calls a society of geneticists. (See HEREDITY) In another direction, the zoölogist finds that chemical reactions accompany and probably cause certain life activities, and to understand these he must affiliate with the biochemist. (See BIOCHEMISTRY.) In still other directions the zoölogist finds important openings for research: along economic lines, as in the relations, especially among the protozoa and the insects, to the causation and transmission of disease, or in the control of plant-feeding insects which offer a serious problem to the agriculturalist. As a result, zoölogy at the present time might almost be considered a group of closely related sciences rather than a distinct science. In all of these, there is the unifying principle that all living matter is in the last analysis composed of protoplasm having similar structure and subject to certain fundamental laws wherever it occurs. It will be convenient to consider separately some of the more important of these subdivisions.

Taxonomy. The classification of animals. According to the older notion species are independently created groups. According to the theory of evolution they are related to one another in that they have all descended from a common ancestor, and the degree of structural resemblances between them is, within certain limits, an indication of the nearness of that relationship. Working on this hypothesis, it is obviously of less importance than was formerly thought that we should endeavor to trace the limits of species; the knowledge of a few thousand specific names is no longer the mark of a great zoölogist, and taxonomy has lost its relatively high position among the subdivisions of the science. Where taxonomy still has valu-

able work to do is in determining the arrangement of animals according to their relationships, in describing new forms which are constantly being discovered, and in delimiting the boundaries of species

While it is difficult to formulate an adequate definition of species, no one doubts that groups exist to which this name properly applies, and it seems certain that differences of a fundamental nature (possibly chemical) underlie these visible external differences which are found among species. If this be true, it follows that the experimental zoölogist should know the species with which he is working, and that a confusion of species may introduce as many errors into his results as would follow the use of impure reagents by a chemist. As an illustration of the practical value of the work of the taxonomist may be cited the case of the sanitarian interested in the control of insect-borne diseases. Yellow fever is carried by one genus of mosquitoes and malaria by another, while a third is harmless so far as disease-carrying is concerned. Obviously an accurate diagnosis of these genera is essential to the sanitarian, and for this information he must look to the taxonomist.

In modern classifications the entire animal kingdom is divided into a series of phyla. As might be expected from the theory of evolution, some animals have developed along peculiar lines so that their relationships to others are obscure, and they are grouped differently by different taxonomists; but aside from some minor differences of this sort there is general agreement as to the following classification:

Phylum	Protozoa.	One-celled animals.
Phylum	Porifera	The sponges
Phylum:	Cœlenterata	Hydra and hydroids, jellyfish, and corals
Phylum·	Plathelminthes	The flatworms (Turbellaria), liver flukes, tapeworms, and nemerteans
Phylum.	Nemathelminthes	The threadworms, trichina, hookworm, etc.
Phylum·	Trochelminthes.	The rotifers.
Phylum	Annulata.	The segmented worms, earthworm, marine annelids, leeches, and gephyreans
Phylum:	Molluscoidea.	The bryozoa and brachiopods.
Phylum:	Arthropoda.	Crustacea, insects, spiders, scorpions, and centipedes
Phylum:	Mollusca.	Clams, snails, and cuttlefishes.
Phylum:	Echinodermata.	Starfish, sea urchins, and crinoids
Phylum.	Chordata	
Subphylum:	Enteropneusta	Balanoglossus.
Subphylum:	Tunicata.	The "sea squirts" and tunicates
Subphylum·	Cephalochorda	Amphioxus
Subphylum.	Vertebrata	Vertebrate animals.

Each phylum is further subdivided into classes and these into orders, etc For the smaller subdivisions the reader should consult textbooks See below, *Bibliography.*

Physiology. This is a study of the functions and activities of the organs of the animal body, and thus a dynamic as distinguished from a purely static study of anatomy. Originally quite distinct from anatomy, except insofar as a knowledge of the structure of an animal is an essential preliminary to a study of its activities, the distinction between the two has largely disappeared with the development of the experimental method. When the embryologist applies the experimental method to the analysis of the process of fertilization of the egg or the form-changes going on in the developing embryo, he is using the methods of the physiologist. The physiologist must, on the other hand, rely on the biochemist for aid in answering many of his problems, especially when appealed to for assistance by the morphologist, thus these three meet here on common ground. Important contributions of physiology to zoölogy are, first, the study of the enzymes, a series of organic substances which seem to be similar to if not identical with the catalytic agents of the chemists and which accompany most if not all of the fundamental physiological processes. This similarity to catalytic agents in their mode of working has led to the belief that they are practically the same, and thus that life is merely a series of these catalytic activities. This leads to the mechanistic conception of life as really nothing but a physicochemical process, a theory opposed by the vitalistic school, who hold that the regulative powers possessed by animals and often exhibited in their ability to adjust themselves to new and unusual conditions indicates the presence of a regulative mechanism independent of any chemical or physical activities going on in the protoplasm. This regulative mechanism is admittedly beyond the reach of any scientific analyses, but the vitalist believes that without the assumption of its presence it is not possible to explain animal activities. At present it seems probable that the mechanistic hypothesis is the more generally held.

Another physiological contribution, of especial importance in medicine but having definite applications in zoölogy, is the discovery of the important part played by the glands of internal secretion, i.e. the endocrine glands. The presence in the animal body of gland-like organs possessing no definite ducts has long been recognized, and they have generally been grouped together as the "ductless glands." Until late in the decade 1914–24, their function was largely a matter of conjecture, although it was recognized that disease of these ductless glands was correlated with definite bodily defects. It is now known that some of these glands, possibly all, secrete into the blood substances known as hormones which are carried by the blood to other parts of the body and which govern the proper development or functioning of those parts. Thus, if the pituitary body does not send off the proper amounts of its peculiar hormone, an abnormal development of the skeleton results The development of a tadpole into a frog seems may be prevented by removing the thyroid from the tadpole, while on the other hand metamorphosis will be hastened if extra thyroid be fed to the animal. The development of secondary sex characters at the time of puberty seems to be dependent on the hormones formed in the maturing sex organs at this time and discharged into the blood to be carried to other parts of in the thyroid gland, and this transformation the body; the effects of castration or removal of the sex organs in hindering the development of secondary sex characters is due to the loss of the hormones caused by the operation. In addition to hormones which produce these easily recognizable characters, evidence is accumulating which makes it seem probable that any organ in the body is capable of producing hormones which may exert some influence on any other organ in the same body. This possibility has been considered in recent discussions of the

inheritance of acquired characters (see HEREDITY), for experimental evidence has been presented to show that changes set up in certain organs may produce changes in the sex cells through the action of hormones and in this way may set up changes in the next generation. At the time of writing, research along this line has only just begun, and few definite results are available; but it seems certain that the possi- dependent on the presence of hormones formed other parts through the action of hormones must be considered in future discussions of heredity.

The widespread phenomenon of luminescence in animals has evidently been solved by physiology. A large number of animals, of which the firefly is the most familiar example, are able to produce light often of very considerable intensity, a form of light production different from any artificial methods known to man in that there is no appreciable loss of energy as heat. This has made the study of animal luminescence of interest to practical engineers, in the hope of applying the method to the problem of reducing the cost of the present wasteful methods employed in all artificial lighting. It has been shown that animal light production is due to the oxidation of a substance called luciferin, apparently a protein, by the action of luciferese, an enzyme. This light in the firefly is used as a sex call, while some deep-sea fishes seem to employ it as a flash light to illuminate the bottom of the ocean where no sunlight can penetrate

Tropisms. The study of animal behavior is of interest from two points of view. One is that of the ecologist who considers the purposive character of many animal activities and the way in which these activities relate the individual to its environment, the other that of the physiologist whose problem is to explain the mechanisms employed in these processes. An influential school of physiologists explain animal behavior by the theory of tropisms As a starting-point in the exposition of this theory we may follow Jacques Loeb, who ranks as its leading exponent, in calling attention to what are known as "forced movements," or peculiar behavior shown by animals in which a portion of the brain is injured or diseased If food be held at a distance in front of a normal dog he will, naturally, go directly toward it. If this experiment is repeated on a dog in which a portion of one cerebral hemisphere has been removed he will no longer go directly toward the food, but in attempting to do so, will continually turn toward the injured side and thus will move in a circle The explanation is that while in the normal animal forward movement is produced by the equal contraction of the leg muscles on the two sides of the body, these equal contractions in turn being due to equal stimuli reaching them from the two cerebral hemispheres, in the injured animal stimuli from the abnormal part of the brain are more or less suppressed and so lead to a lesser stimulus on one side than on the other. As a result, the stronger leg movements on one side bend the body toward the injured side. The animal does not circle from any desire to do so, but because if it moves at all its muscles force it to go in this direction.

In the well-known tendency of some insects to go toward a light, the tropism theory recognizes a precise analogy to the forced movements of the injured dog. If the common fruit flies *drosophila* are put in a tube and the tube turned so that only one end is lighted, or one end turned toward the window so that light rays strike that end before they do the other, the flies, if they move at all, will go directly to the end toward the light If the tube is turned through 180° they will again go toward the lighter end. According to the tropism interpretation, these movements are produced as follows: If the insect is facing the light at the beginning of the experiment, light rays fall with equal intensity on the two eyes, equal stimuli are sent from the eyes to the central nervous system and from there to the leg muscles, the muscles of the two sides are equally stimulated, and the animal moves directly forward Should the insect be standing so as not to face the light directly, one eye will receive a stronger stimulus than the other; this unequal stimulus leads eventually to a stronger contraction of the muscles on one side of the body than on the other and thus turns the body toward the less stimulated side. As the body is turned, the eyes are eventually brought to a position where they receive stimuli of equal strength, and the animal then moves toward the direction of the light rays. This is then a forced movement resulting from the action of the light rays on the physicochemical make-up of the animal's body and has nothing analogous to an intelligent desire to go to the brighter region. Similarly the moth, when it flies into a candle flame, does so because the physicochemical composition of its body responds in a precise, mechanical fashion to light stimuli; and the moth if it moves at all, is forced to go in that one direction.

In the illustrations given, the tropism is known as "positive" because the animal moves toward the source of the stimulus. Other animals show a "negative" tropism in that under these same conditions they collect at the place farthest from the source of the stimulus. A reversal of this tropism may appear, however, in that a "positive" animal may become "negative," and vice versa. This reversal is explained by Loeb as due either to a modification of the photochemical processes or to an effect on the nervous system and may be experimentally produced in the laboratory by subjecting the animals to chemical or mechanical treatment. It also frequently occurs in nature as when the larvæ of a barnacle are strongly positive to light at the time of hatching and become equally strongly negative when they are a little older. This reaction to light is called heliotropism. Other tropisms are known as chemotropism, galvanotropism, thermotropism, rheotropism, anæmotropism, stereotropism, and geotropism, according as the stimulating agent is chemical, electrical, heat, current of water, current of air, contact with solid bodies, or force of gravity The responses of animals to these various stimuli are frequently quite marked and are all, according to the tropism theory, purely forced, mechanical movements resulting from the stimuli acting on the physicochemical composition of the complex of structures making up the body of the animal. By Jacques Loeb this tropistic explanation is extended to cover all animal activities even to the so-called higher intellectual and emotional processes in man.

Some experiments on insects are difficult to explain on this theory. According to it, the constantly acting influence of the light rays

keeps an animal turned in the proper direction, and, so to speak, steers it in the way it should go; but a firefly on receiving a flash from his mate will turn and go directly to her, even though the flash is but temporary in duration and the greater part of his journey is carried on in the dark. This observation was recorded by Mast, who has also, as a result of a reëxamination of the "orienting" reactions of insects, concluded that even in these cases the effective stimuli are not symmetrically applied as the tropism theory maintains, and the process of adjustment is really a reflex action. A similar explanation would be given of all of the other tropisms. Students of behavior also, notably those who have worked with the higher *hymenoptera* such as the wasps, are generally agreed that it is impossible to explain their activities as tropisms, in the sense in which the word has been defined above. The term tropism with the appropriate prefix is convenient as a descriptive term and is often so used without necessarily implying the tropistic interpretation of the mechanisms employed. In the recent development of physiology, this tropistic concept has been of very great value as a stimulus to investigation, and its importance as such would not be lessened even if its final conclusions are overthrown

Sex Determination. For practical as well as sentimental reasons the subject of sex determination has received an immense amount of attention. The breeder of cows or the breeder of chickens for egg production could greatly increase his profits if he could control the sex of his animals so as to produce a large excess of females, and in human society desire is often expressed for offspring of one sex rather than another. The generally accepted explanation at the present time is based on the number of chromosomes in the sex cells. In the nucleus of each cell in the body is a substance called chromatin, which, at the time the cells divide, groups into bodies known as chromosomes. The number of these chromosomes is constant in any one species and is generally even. The exceptions to this rule are where in a number of animals one sex is found to have regularly one more chromsome than the other. In the best-known cases, those of some of the insects, the female has an even number and the male one less, or an odd number. Ordinarily the chromosomes occur in definite pairs, and this odd one, in the case cited, is recognizable as equivalent to one of a certain pair in the female. These are known technically as the "X" chromosomes, so that the female has two X's, the male only one. In other cases the number in the male is even, due to the presence of a "Y" chromosome, which, however, does not act as a mate to the X, so that so far as the X is concerned, its presence or absence seems a matter of indifference. In the peculiar series of processes known as maturation through which the sex cells pass before they unite, division is such that each mature egg cell contains only one X, while among the spermatozoa one-half have one X, and the rest have none. If a spermatozoön with one X fertilizes an egg, the result is a cell with two X's, and a female results. If the egg is fertilized by a spermatozoön having no X, the resulting individual is male. If this explanation is correct it follows that sex is determined at the time of fertilization of the egg and not by later agencies operating on the developing embryo. In some other animals this chromosomal action is reversed in that it is the male who has the even number, one more than the female. Recent work indicates that this is not due either to a greater or less quantity or to peculiar quality of the X chromatin but rather to a certain proportion between the number of chromosomes and the other chromosomes or "autosomes." Observations by Bridges on the fruit fly show a positive correlation between the varying numerical proportions of these two kinds of chromosomes and the normal and abnormal sex conditions in the adult flies.

Embryology. Reproduction in animals is accomplished by both asexual and sexual methods. In the former case, there is either a growth of a bud from the surface or a division of the body into two parts, followed by a growth of the bud or separated portions until the full adult size is reached. Sexual reproduction is the development of a new individual from a specialized cell, the ovum or egg, derived from the ovary of the female, and this egg either develops without further treatment, a condition known as parthenogenesis and of frequent occurrence among insects, or in the vast majority of cases fuses with a spermatozoön derived from the testis of the male, and this product, the fertilized ovum, is the starting-point of the new individual. By repeated divisions of this fertilized egg and its descendant cells a many-celled body is formed in which differentiations arise, and finally the completed animal with its complex of organs appears. Observations on the developing embryo in the hen's egg are easily made and were described as early as 1621 by Harvey, whose dictum, "Omne ovum ex ovo," dates from this time. The foundation of modern embryology was laid by von Baer, who discovered the mammalian ovum in 1828. In his completed work, published in 1834, von Baer demonstrated the existence of the primary "germ layers" which occur in all of the metazoa. In this same work he announced the discovery, since known as von Baer's law, that in passing from the egg to the adult state the embryo of a higher form goes through stages in which it resembles the embryo of lower forms.

Louis Agassiz pointed out that in thus passing from the one-celled egg to the adult condition an embryo passes through a series of stages in which it resembles a series which would be formed if we arranged adult animals in order of increasing structural complexity from the simple protozoa to the higher metazoa, and he argued that this and the series of von Baer were prearranged by the Creator at the beginning in order to demonstrate his plan of creation. A different interpretation was later put on these facts by the evolutionists, who recognized in these series of embryonic stages a recapitulation of the ancestral history of the race. The German zoölogist Haeckel was the most prominent advocate of this theory, and largely through his influence it was generally believed that a fairly accurate history of the ancestry of an animal could be obtained through a study of its embryonic stages. During the 1870's and 1880's, this belief was the inspiration of a great deal of descriptive embryology, but this phase of the subject has been very largely given up, partly because of the discovery that may embryonic characters are newly acquired and not ancestral, and partly because of the shifting of interest to the experimental method.

This law of von Baer is by no means abandoned, but embryologists generally recognize that its application is limited to more generalized characters and does not extend to the finer details.

By the end of the nineteenth century embryologists were divided into two groups, descriptive and experimental. The descriptive embryologists, following the lines laid down by von Baer, were studying with constantly improving technique the normal development of animals and had accumulated much information of a purely descriptive character. A speculation as to the real composition of the fertilized egg arose from this work The egg appears to be perfectly homogeneous, but out of it, after repeated divisions, arises a differentiated body. Is the homogeneity merely apparent and does the egg contain materials of different kinds which are separated from one another by the division processes, or is it real and does differentiation depend on the position of the cell in the complex and its relation to surrounding cells? This and similar questions led to experimental embryology, and while with the twentieth century descriptive embryology has brought out much new information about the normal development of animals, the experimental method has largely overshadowed it in interest. One answer to the question was sought through the method of cell lineage. This consists in following the developing egg cell by cell until different regions or organs of the adult body are outlined. From learning in this way the origin and fate of each cell, it was found that in many cases the pattern of the cleavage is so regular and the relation of certain cells to certain organs so definite and certain as to indicate that cleavage is really a separation of different kinds of material from one another. In some animals this conclusion seems the more certain, because from the beginning certain portions of the eggs differ from the remainder in color and apparently follow definite and prearranged paths until they give rise to definite organs in the new individual. Even where there is not this visible distinction the regularity of the divisions indicates a similar though invisible condition.

A second line is more definitely experimental. Developing eggs are mutilated in various ways, as by the separation of the cells from one another in the early cleavage stages, and a study is made of the behavior of the resulting separated blastomeres. Others are treated chemically in such a way as to alter the osmotic pressure or the chemical nature of the environment. In this fashion an experimental analysis of the forces at work in and on the embryo may be made. In later stages operative interference with normal developmental processes is employed for the same purpose. These later methods are such as removing the spinal cord of an amphibian embryo and replacing it end for end, or removing arms from similar embryos and grafting them into other parts of the body. The general purpose of all of these experiments is to secure data bearing on the question of how far an organ is self-differentiating, and how far its differentiation is a result of influences brought to bear on it from neighboring organs. For a discussion of the results obtained by these experiments consult titles given in the bibliography

Some eggs, as in many insects, develop parthenogenetically, while others normally require fertilization by a spermatozoön. In many eggs of this latter type, it has been found possible to induce parthenogenesis by artificial means. The agent employed may be a change in the chemical composition of the surrounding medium; for example, adding certain chemicals to the water in the case of water-living animals, or by mechanical means such as shaking; and Jacques Loeb has succeeded in producing parthenogenetic development in the frog up to sexually mature individuals by simply pricking the egg with a needle. It would appear that one function of the spermatozoön is to stimulate the egg to develop, and this function may be replaced by other agents. There is reason to believe that even in the mechanical stimuli a chemical change is the ultimate cause of the development, and Lillie has recognized this chemical process in the working of a substance called fertilizin which is secreted by the egg and which when it comes in contact with a spermatozoön sets free a substance acting as a stimulus to development. Loeb, on the other hand, considers that anything which can produce an egg membrane is an efficient stimulus and will start the developmental process.

Evolution. Darwin succeeded where his predecessors failed, partly because of his formulation of the theory of natural selection as a factor in evolution, but it seems probable that his successors overemphasized the severity of the struggle for existence and the consequent importance of natural selection. In more recent times the validity of this hypothesis as the chief factor in evolution has been seriously called in question, even to the extent of its abandonment. While this latter position is certainly too extreme, it is true that there are many difficulties in the way of explaining how slight variations could have, as Darwin supposed, selective value; and it seems reasonable to believe that while natural selection can operate on variations after they have appeared, it is not a valid explanation of their appearance. A widespread and unfortunate misunderstanding arose through the assumption by the strict natural selectionists of the name "Darwinian." Since in the popular mind Darwinism and evolution are synonymous, rejection of Darwinism by zoölogists is understood to mean rejection of evolution. Used in this sense, Darwinism means merely one explanation of evolution, and that not the most widely held.

A large number of zoölogists join with botanists in ascribing the origin of new species and new adaptations to mutation, a position which we very largely owe to the work of the botanist De Vries. Any group of plants or animals, considered with respect to any particular character, will show a considerable range of variability for that character, varying in both directions, above and below the mean or average. Darwin thought that selection of extreme variates above or below the mean and a breeding from these variates would result in a new range of variability in the selected direction and the establishment of a new mean. Practically all the results obtained by experiment along these lines have negatived this conclusion, and it generally happens, if not always, that the offspring of an extreme variant normally arrange themselves around the mean of the whole race irrespective of the degree of variation of the parent. The mutation theory supposes that from some cause which is not un-

derstood but which certainly exists, there appear at intervals changes in the hereditary material such as to lead to the establishment of a new mean with a new range of variability. Such a change is called a mutation. A mutation may be very slight in amount, so as to resemble a mere individual variation, or it may be large as in the fruit fly, when the normal red eye is replaced by a white one. In any case it is recognizable by its heritability and its establishment of a new mean. It is believed that natural selection first operates after this mutation has appeared and determines whether or not it shall survive. Natural selection, then, as De Vries has expressed it, "has nothing to do with the *arrival* of a species but determines its *survival.*"

The Lamarckian theory of the inheritance of acquired characters, so widely accepted by most post-Darwinian writers, was as a result of the work of Weismann largely abandoned; but later experiments indicated that it might possibly be rehabilitated as a factor in evolution. (See HEREDITY.) Some observers secured results which seem to indicate that instead of variations appearing as Darwin supposed, in all directions around a mean, they have occurred only in certain definite lines as if predetermined from the beginning; i.e. as if the composition of the germ-plasm of the race is such that variations can only occur in a few limited directions. Eimer, working on insects, and Whitman, on the development of the color pattern of pigeons, got evidence in favor of this theory, called orthogenesis. An illustration of the supposed working of this factor would appear in the case of the Irish elk, extinct apparently because of the overdevelopment of its horns, which became so large and unwieldy as to lead to the death of the animal. Spencer cited this as a case of inheritance of acquired characters where the horns eventually became large through much use and proved a fatal handicap in the struggle for existence. Since serious difficulties appear in the way of accepting the Lamarckian hypothesis, orthogenesis is proposed as an alternative explanation.

Histology. With increasing perfection of microscopic technique, anatomists studied more and more thoroughly the finer details of animal and plant structure, and this microscopic investigation eventually developed into a distinct subdivision of anatomy called histology. This concerns itself very little with the structure of protoplasm or of the undifferentiated cell but deals mainly with the differentiated condition of cells as they appear in combination to form the various tissues of the body. This study may be directed toward the normal structure of tissues, or it may deal with their appearance under abnormal or diseased conditions. In the diagnosis and treatment of many diseases, a comparison of the normal with the diseased condition is often of very great practical importance.

Cytology. More recently cytology, or the division of miscroscopic anatomy which studies especially the undifferentiated protoplasm and the structure of the simple cell, has received especial attention. While the earlier cytologists thought they recognized visible structures in protoplasm, the later tendency was to regard most of these structures as artefacts or abnormalities resulting from the manipulation to which the material must necessarily be subjected in order to study it, and to think of protoplasm as a complex colloidal compound which may in whole or in part change from a sol to a gel condition and back again, these changes being in some way connected with the life manifestations of the protoplasm. Two kinds of material are recognizable in the cell, the nucleoplasm inside and the cytoplasm outside of the nucleus, differing from one another in their physicochemical composition and containing different kinds of materials. In the nucleus is the chromatin which has been shown to have very great importance in the life of the cell and is an important agent in the transmission of hereditary qualities. More than any other portion of the cell the behavior of this chromatin during cell division by mitosis has attracted the attention of cytologists. Still later, attention was turning to the study of cytoplasmic inclusions known as chondriosomes and Golgi apparatus, structures which lie in the cytoplasm and which, owing to concentration of attention on the chromatin, were largely ignored by earlier cytologists. Opinions differ as to whether these are merely temporary structures in the cytoplasm or permanent organs with some possible function in heredity.

Ecology. This is a study of the living organism in its natural environment with especial reference to the reasons why it should be in that environment rather than in some other. In the environment of an animal would be included climatic conditions, chemical composition of the water or soil in or on which it lives, location of its food, presence or absence of enemies, and conditions governing mating and care of the young. Adams divides the subject into three aspects: individual, in which a particular kind of animal is studied throughout its range of distribution; aggregate, where the taxonomic unit or family is traced throughout its early history; and associational, in which the animal or group of animals is studied with reference to its association with other organisms. Ecology as thus defined has received little consideration as compared with the amount of research devoted to morphology, embryology, and physiology. A rather cheap criticism, frequently expressed in this connection, is apparently based on the assumption that studying an animal under a microscope or in a laboratory in some way alters its character, so that what is there seen is unnatural and abnormal. The absurdity of this extreme position is sufficiently obvious, but it is certainly true that the point of view of the old time naturalist has been too much ignored and that its reappearance under the newer name of ecology is a sign of progress.

It seems probable that associational ecology offers the most interesting field. A study of this sort would include, first, a list of the species of animals and plants living in a given locality, and then a consideration of the various factors that have brought them together. The climatic and the soil conditions would be of much importance, but the main interest would lie in a study of the relationships existing between the component species of the association. These relationships may be hostile, as where one animal feeds on another; mutually beneficial or symbiotic as in the case of the sea anemone carried on the shell of a crab; commensal as in the small crab living in the oyster shell, where neither animal is benefited; or parasitic, where one lives permanently attached to the body of the other; or they may merely amount to an occupation of the

same general territory without the animals' having any very definite influence on one another. The breeding habits of component species would also be considered in reference to their modification through the association. It is not to be understood that in all cases definite and precise reasons can be assigned for the distribution of animals, for because of their locomotor powers their appearance in a given locality might be quite accidental Carefully conducted observations should, however, separate the accidental from the definitely significant distributions. A study of this sort might cover a considerable area, or it might be quite limited, as for example, the ant colonies studied by Wheeler, where in a very restricted area associations exist between a considerable number of animals, and complicated ecological conditions result.

Death. A question to which biologists devoted much attention is whether death is an inevitable and necessary process, or whether, given a continuous optimum adjustment of internal to external conditions, any organism might, barring accident, be immortal. Protozoa reproduce by transverse fission. The body of the parent divides into two, usually equal, parts, each of which in its growth comes to resemble the parent in size and form. Each of these later divides, and this is continued indefinitely, no portion of any generation dies unless by accidental injury. It is evident that in this process which began with the first protozoön and will continue to the last, we have a true bodily immortality. Further, Carrel has been able to keep portions of the heart of an embryo chick alive in artificial culture media for a period several times the normal length of life of the fowl, and there seems no reason why this might not be continued indefinitely. Similar results have been reported by others, and the conclusion must follow that there is nothing inherent in protoplasm itself which inevitably leads to senescense and death.

When, however, we combine these individually potentially immortal cells into a system of tissues and organs making up the body of a complex animal or plant, death appears as an apparently inevitable process at the end of a period which is, roughly speaking, characteristic for each race, although length of life varies in different families within a race and is undoubtedly an inherited trait Several explanations for the senescense and death of many-celled organisms have been given, some referring them to changes in the relative sizes of nucleus and cytoplasm in the cell, others to a decrease, with advancing differentiation, of ability to assimilate nutrition and to eliminate waste, and still others to the fact that the combination of highly differentiated cells into tissues and their relations to one another make up so complicated a bit of machinery that failure to function normally in one part disorganizes the whole mechanism. It would appear, from any or all of these suggestions, that death is the price we pay for the differentiation of tissues making possible the efficiency of our highly organized bodies, and that had we been content to remain protozoa, we might all be immortal.

Economic Zoölogy. Important economic applications of zoölogy appear along both medical and nonmedical lines. Some protozoa cause disease, some Plathelminthes and Nemathelminthes are dangerous parasites, and some insects carry disease-producing organisms from one animal to another These are obviously conditions of interest to physicians and sanitarians, who derive their information concerning the anatomy, life histories, ecology, and methods of combating these organisms from the researches of the zoologists. In addition the physician gets from the same source his knowledge of normal anatomy and embryology. Most of the nonmedical applications have to do with the production and preservation of man's food and clothing. Among the invertebrates the most important are the insects, for while only a few of these produce food (e.g. the honeybee), and others material for clothing (e g. the silkworm), a large number, which appears to be increasing, cause serious losses through their attacks on commercially valuable plants. An appreciable proportion of the cost of production of food and clothing is due to the expense involved in fighting the insect enemies of the plants from which these materials are obtained. In the United States the boll weevil which is attacking the cotton crop, and the gypsy moth attacking shade and fruit trees are striking examples of this situation Less spectacular but similar problems arise in all parts of the country, and large amounts of money are spent annually in attempting to solve them; this work is largely under the supervision of State and Federal entomologists. Similar work is under way in other countries, although insect pests seem to be much more numerous in North America than in any part of Europe. Other applications of economic zoology are in the propagation of edible mollusca, crustacea, fish, terrapin, etc , in the study of fur-bearing animals such as seals, and in devising means of protection against predatory animals other than insects.

ZORN, ANDERS LEONARD (1860–1920). A Swedish painter and etcher. The last years of his life were spent entirely in Sweden. His exhibitions showed a curious juxtaposition of portraits of men and women in irreproachable society dress and strikingly realistic nudes. He continued the production of etchings of the old technical excellence and produced several fine pieces of sculpture, including "The Broken Pitcher" (1920).

ZSIGMONDY, RICHARD (1865–). An Austrian chemist (see VOL. XXIII). He invented the *Membranefilter* in 1917 and wrote *Lehrbuch der Kolloidchemie* (1920).

ZUKOR, ADOLF (1873). An American motion-picture official, born at Riese in Hungary, and educated in Hungary and in the schools of New York City. He came to the United States in 1888. For several years he engaged in business in New York City and Chicago and was later the owner of several vaudeville and motion-picture theatres in New York City. He founded the Famous Players Film Company in 1912 and later became president of the Famous Players-Lasky Corporation.

ZWEIG, STEFAN (1881–) An Austrian writer, born at Vienna, where he studied philosophy at the university He wrote poetry, fiction, plays, essays, and many translations, and is the author of *Silberne Saiten* (1901); *Die Fruhen Kranze* (1907); *Tersites* (1907); *Das Haus am Meer* (1911); *Der Verwandelte Komodiant* (1913); and the tragedy *Jeremias* (1918). He also wrote *Die Liebe der Erika Ewald* (1894), *Erstes Erlebniss* (1911), *Fahrten* (1920), and essays.

COURSES OF READING AND STUDY

Preface

THE purpose of the present volume, as its name suggests, is to offer help towards self-instruction in the various arts and sciences, utilizing the *New International Encyclopædia* as a general text-book. There is little need to emphasize in this place the rôle of popular educator played by a work like the Encyclopædia. This has been long recognized; and, from a mere work of reference consulted at odd moments for fragments of information, the modern Encyclopædia has become in thousands of homes a source of common culture, the basis of a thorough training in the principles and facts of History, Law, Literature, the Fine Arts, Religion, Biology, Engineering, Physics, Chemistry, or Agriculture. Especially where access to large libraries is difficult or impossible, its value is apparent. In every department of human knowledge, it speaks with a copiousness unequalled in the average text-book and a degree of authority attainable only when every department, and subdivision of a department, is covered by an acknowledged specialist in the field.

A glance at any chapter in the book will show the method pursued. The aim has been to make every chapter a complete summary of the subject with which it deals by arranging the material as the reader or student would find it arranged in a systematic treatise on the subject. The amount of text in each chapter has necessarily been reduced to a minimum, only so much being given as is essential to trace the connection between the successive groups of titles. But, when it is considered that every title in every group represents from two or three hundred to fifteen thousand words of text, the completeness of treatment will be realized.

Within the chapter the material has been divided and subdivided in such a manner as to facilitate study on special topics. If the reader, for instance, desires to make himself particularly well acquainted with a certain period in American History, he need but turn to the proper section in Chapter I., where the subject of American History is outlined in five sub-headings with as many groups of titles; and at the end of the section on American History he will find a list of authorities in whose works he may carry on supplementary reading to any extent. In the same manner, a person interested in the ceremonial or hymnology or clerical vestments of the Roman Catholic Church will find these topics treated in related groups of titles as a section in the chapter on Religion. Under Chemistry one may study the entire subject, carefully outlined for such a purpose, or may concentrate on the acids or the salts or the fats. In every chapter, the technical exposition is supplemented by comprehensive lists of biography wherein the historical aspect of the subject finds complete treatment.

In quoting titles in the lists, the form given is that, of course, which appears in the Encyclopædia; as, CRUELTY TO CHILDREN, PREVENTION OF; or, MACHINERY, ECONOMIC EFFECTS OF. Where reference is made to a long article, the particular section is indicated; as, "See section *The Renaissance* under SCULPTURE," in which case, the reader will turn to Sculpture in the Encyclopædia. In the biographical

titles, the full Christian name, or the corresponding initials, is given as a rule; as ADAMS, SAMUEL; ADAMS, H., KIPLING. The alphabetic arrangement of titles in the Encyclopædia makes reference to volume and page obviously superfluous.

It is in its orderly marshalling of the material contained in the Encyclopædia that we believe the value of this book consists. It is quite unlikely that the average reader, left to his own guidance, will plan his course in such a manner as to produce the fullest results with the least waste of time. Where the subject is unfamiliar, he is as apt at the start to hit upon the middle of it as upon the beginning, and, in passing from article to article, there is always the danger of his missing the logical sequence of topics. A mere index would here be useless. What is necessary is a carefully planned outline that shall lead the reader, step by step, from elementary principles to the most specialized treatment. Such a guide this Outline aims to be.

The preparation of this volume, carried on under the supervision of the Editors, has been in the direct charge of Mr. SIMEON STRUNSKY, of the staff of the *New International Encyclopædia*, and the supervision of the revision for the second edition under the charge of Mr. IRWIN SCOFIELD GUERNSEY.

—THE EDITORS.

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Chapter 1. History

HISTORY, which we may define as the record of man's life on earth and the sum of his achievements, would include in its broadest aspect the entire story of human development from Palæolithic man to the present day. As a matter of convenience, however, in this book we shall leave the beginnings of associated human life to be treated under the heading of Anthropology and Ethnology, where, too, will be found the material for the stories of those peoples and tribes which to the present day have remained without the pale of our civilization. Here we shall take up the narrative at a point in time when we first catch a glimpse of the nations whose culture, evolved during thousands of years, and passed on from hand to hand, has become the heritage of the present day. The traditional division into Ancient, Mediæval, and Modern history is followed, and in accordance with custom the account begins with the nations of the Mesopotamian region, and passes on through Persia and the empire of Alexander into Rome, where also the course of Egyptian, Jewish, Phœnician, and Greek history, taken up in turn, leads us. With Rome, Ancient history ends. India, China, and Japan, though their history goes back to a past coeval with the period we call ancient, are treated apart because of their far less intimate connection with the civilization of Europe, wherein our interest is centered. Mediæval history takes up the story at the fall of Rome, traces the amalgamation of the old world with the new, the growth of the Church, the rise of States, and the transition, through inward development and outward contact with Asia and America, to modern times. There European history becomes largely the story of nations and their conflicts. One by one due treatment is accorded them, the field widening as Australia, Africa, and Asia come within the scope of European interests. The record ends with a section on the history of the United States outlined with greater detail than the account of other lands.

First some conception of the methodology of historical writing and a bird's eye view of the history of the world may be useful, for which see:

History
Asia
Europe
Africa
America
Australia

A. Ancient History

1. Babylonia, Elam, and Assyria.

Archæological research has carried back the origin of Sumerian and Akkadian civilization to the fifth millennium B. C., given us a fairly continuous history of Babylonia, Elam, and Assyria, and revealed something of the literature, science, art, laws, and social life of these countries. Babylonia was ruled at times by Gutians, Elamites, Kassites, Assyrians, and Chaldæans, but always exercised a power-

ful cultural influence. The Assyrians established an empire that finally included Elam, Mesopotamia, Syria, and Egypt. A part of it fell to the Chaldæan kingdom, which was conquered by Cyrus in 539 B. C. See:

(*a*) For the Land:
Mesopotamia
Euphrates
Tigris
Babylonia
Assyria
Arrapachitis
Adiabene
Shinar
Elam

(*b*) For the Cities:
Nippur
Babylon
Calah
Ur
Erech
Nineveh
Assar
Khorsabad

(*c*) For the Kings:
Sargon
Hammurapi
Shalmaneser
Tiglath-pileser
Asurnazirpal
Sennacherib
Esarhaddon
Sardanapalus
Nabonassar
Nabopolassar
Nebuchadnezzar
Belshazzar
Cyrus

(*d*) For the People, Religion, and Language:
Sumerian Language
Chaldæans
Kassites
Amorites
Mitannians
Merodach
Ishtar
Semitic Languages
Babylonian Art
Assyrian Art
Cuneiform Inscriptions

(*e*) For the Historians and Investigators:
Botta, P. E.
Delitzsch, F.
Layard, A. H.
Meyer, E.
Oppert, J.
Rassam, H.
Rawlinson, H. C.
Sayce, A. H.
Schrader, E.
Smith, G.
Winckler, H.

2. Egypt.

From the monuments it is evident that the Egyptian civilization was in its origin independent of the Babylonian and goes back to as early an antiquity. From primitive times when the land was divided into two sections, the Delta and the South, we pass through many dynasties of pyramid and temple building kings to a time of subjugation by foreign invaders, of conquests in Palestine and Asia Minor, of decline, and of reduction by the Persians, by Alexander of Macedon, and by Rome. A cheerful people, influenced greatly by their priests, submissive to their kings, worshiping many gods and animals, they left behind them massive structures of which we have not yet the secret. Their

priests read the stars and knew geometry, speculated on the soul, and probably passed on to the Phœnicians the alphabet which was to be ours. (?— B. C. 30) See:

(*a*) For the Land:

Egypt
Nile
Delta
Nubia
Ethiopia
Libya
Suez Canal

(*b*) For the Cities and Monuments:

Memphis
Tanis
Thebes
Karnak
Luxor
Ramesseum
Pyramid
Rosetta Stone

(*c*) For the Kings:

Menes
Cheops
Chephren
Amenemhat
Usertesen
Amasis
Amenophis
Thothmes
Hatasu
Rameses
Psammetichus
Necho
Amasis II
Ptolemy
Cleopatra

(*d*) For the People, Religion, Language, and Culture:

Egypt
Hamites
Hyksos
Rê
Horus
Osiris
Thoth
Athor
Ammon
Apis
Set
Isis
Nephthys
Anubis
Hieroglyphics
Egyptian Art
Egyptian Music

(*e*) For the Historians and Investigators:

Egyptology
Breasted, J. H.
Brugsch, H. K.
Champollion, J. F.
Lenormant, C.
Lepsius, K. R.
Manetho
Mariette, A. E.
Maspero, G. C. C.
Naville, E. H.
Petrie, W. M. F.
Renouf, P.
Rougé, O. C. E.
Sayce, A. H.
Wilkinson, J. G.

3. Phœnicia and Asia Minor.

What is now Syria and part of Asia Minor was in the earliest times debatable ground between Egypt and the Mesopotamian monarchies. On the Palestinian coast the Phœnicians, with little territory, developed a splendid industry and commerce and in their ships carried the seeds of Babylonian and Egyptian civilization over the Mediterranean basin. Later, when the

Hyksos were invading Egypt, a people known as the Hittites appear, stout fighters who render a good account of themselves against the Assyrians and Egyptians. Their homes were in Northern Syria and in Eastern Asia Minor, but about B. C. 700 they disappeared, leaving little trace behind them. See:

(*a*) For the Phœnicians:

Phœnicia
Sidon
Tyre
Acre
Byblos
Cyprus
Carthage
Hiram
Melkarth
Astarte
Phœnician Art
Amarna Letters

(*b*) For the Hittites:

Hittites
Syria
Boghaz-Keui
Eyuk
Mitannians
Cappadocia
Carchemish
Marash
Hamath

4. The Jews.

The Jews form the third in the group of peoples lying between Egypt and Babylonia and affected by the influence of both. The Hebrews, a Semitic tribe of nomads, after wandering through the land of Canaan, enter the land of Goshen, a territory belonging to Egypt, are there held in bondage, and, hammered into a nation by persecution, escape, conquering for themselves the land of Canaan and passing thereby from the nomad into the agricultural stage. See:

Jews
Palestine
Goshen
Semitic Languages
Abraham
Isaac
Jacob
Esau
Amarna Letters
Exodus
Moses
Aaron
Joshua
Canaan
Simeon
Judah
Levi
Gad
Naphtali
Issachar
Dan
Zebulun
Ephraim
Benjamin

Ruled by warrior leaders for a long period, the people finally obtain a king, but after a hundred years the nation breaks into two, the northern, Israel, falling to Assyria, the southern, Judah, 150 years later to Babylonia. The Babylonian exiles return and re-establish the Jewish state in the form of a theocracy based on a purified Yahwe worship. See:

Jews
Saul
David
Jerusalem
Solomon

Judah
Jeroboam
Joash
Abimelech
Jehosaphat
Ahab
Josiah
Hezekiah
Samaritans
Babylonia
Nehemiah
Ezra
Cyrus
Amorites
Philistines
Aramæans
Ammon
Moab
Edom
Judges, Book of
Kings, Books of

The reëstablished State passes from the suzerainty of Persia to that of Macedonia, the Seleucid kings of Syria, and Rome, rising against whom, Jerusalem is taken (A. D. 70), the Temple destroyed, and the greater part of the nation scattered over the Roman world. The insurrection of Bar-Kokba in the second century is the last forcible assertion of the national spirit. The Jews now enter upon their historic rôle of wanderers, subject alternately to persecution and favor at the hands of rulers and peoples, and held together as a folk by the Law and the Talmud. See:

(*a*) Jews
Babylonish Captivity
Antiochus
Maccabees
Herod
Sadducees
Pharisees
Zealot
Essenes
Zadokites
Messiah
Bar-Kokba
Spain
Crusades
Anti-Semitism
Zionist Movement

(*b*) For the Law, Language, Literature, and Science:
Bible
Pentateuch
Talmud
Gemara
Mishna
Cabbala
Halacha
Haggada
Midrash
Maimonides
Yiddish

(*c*) For the Historians:
Josephus, Flavius
Ewald, G. H.
Wellhausen, J.
Renan, E.
Graetz, H.

5. PERSIA.

In northeastern Iran, a people, the Medians, shake off the yoke of Assyria in the eighth century B. C. and soon attain power over their former masters, but fall themselves under the domination of the Persians and Cyrus, who brings under his sway all of Mesopotamia and Palestine. Under his successors Persia becomes the greatest empire of pre-Alexandrian times, spreads to the Mediterranean, and enters Egypt, but fights vainly against the Greeks and is conquered by the young

hero of Macedon. The empire falls apart, the heart of it, Persia proper, passing in turn to the Parthians, Arabs, Turks, Mongols, and Turks again, till it remains what it is at the present day, a piece in the game between England and Russia in Asia. See:

(*a*) For the Land and the People:

Iran
Media
Persia
Asia Minor
Bactria
Parthia
Armenia
Susa
Persepolis
Ctesiphon
Ecbatana

(*b*) For the Dynasties and Kings:

Achæmenidae
Seleucidae
Arsacidae
Sassanidae
Abbasides
Samani and Dilemi
Ghaznevides
Ghuri
Seljuks
Astyages
Cyrus
Cambyses
Darius
Xerxes
Artaxerxes
Khosru
Hulaku Khan
Timur
Abbas I.
Nadir Shah

(*c*) For the Culture:

Persian Art
Persian Language
Persian Literature

6. Greece.

The seeds of culture brought to Greece by the Phœnicians from Babylon, Egypt, and Asia Minor, developed into a new civilization, the highest in many respects the world has as yet seen, which influenced mightily the history of future ages. The legendary accounts, in the tales of heroes and gods, probably reflect historical conditions. See:

Mythology
Danaüs
Cadmus
Hercules
Theseus
Minos
Argonauts
Trojan War
Agamemnon
Ulysses
Achilles

Greek history begins with a succession of great migrations from the mainland eastward towards Asia Minor. When authentic history begins, Greece appears as an agglomeration of small independent states, in a state of transition from the monarchical form of government into tyrannies, oligarchies, and democracies. See:

(*a*) For the Land:

Greece
Asia Minor
Crete

Thessaly
Bœotia
Epirus
Attica
Peloponnesus

Eubœa
Lesbos
Chios
Ithaca
Pydnus
Olympus
Delos

(*b*) For the Cities:

Athens
Sparta
Thebes
Mycenæ
Tiryns
Argos
Corinth

(*c*) For the People:

Archæology, II
Hellenes
Danai
Dorians
Ionians
Æolians
Achæans

(*d*) For the Men:

Lycurgus
Solon
Pisistratus
Clisthenes

The Greeks, after a long, successful struggle against Persia, won national greatness. Democratic Athens first takes the lead among the Greek city states and for a half century plays a brilliant part, then succumbs to Sparta, which in turn falls before Thebes. Disunion brings Greece under the sway of Macedon, whose young king, Alexander the Great, conquers Persia and Egypt and spreads the Hellenic culture in his new realm. Greece proper is ruled by Macedon till it falls with Macedon under the power of Rome. See:

Greece
Athens
Miltiades
Marathon
Themistocles
Salamis
Thermopylæ
Aristides
Leonidas
Ephialtes
Pericles
Conon
Nicias
Sparta
Syracuse
Lysander
Agesilaus
Antalcidas
Pausanias
Epaminondas
Pelopidas
Mantinea
Leuctra
Macedon
Philip II
Demosthenes
Æschines
Alexander the Great
Chæronea
Antipater
Demetrius Poliorcetes
Ætolian League
Achæan League
Philopœmen
Pydna
Cynoscephalæ

In the Greek city states the problems of democracy were well worked out, and politics became an exact science. The principles of democracy were carried over the basin of the Mediterranean and the Black Sea, wherever the Greeks, the successors of the Phœnicians as traders and colonizers, went. See:

(*a*) For Greek Government:

Monarchy
Tyrant
Democracy
Aristocracy
Despot
Ecclesia
Areopagus
Ostracism
Boule
Ephori
Archon
Solon
Lycurgus
Lysander

(*b*) For the Greek Colonies:

Ionia
Mitylene
Ephesus
Halicarnassus
Chalcidice
Colchis
Chersonesus
Cyrene
Sicily
Magna Græcia
Marseilles

Over all the Greek world the Hellenic culture prevailed as in the home country. See:

Architecture, Greece
Greek Language
Greek Literature
Greek Music
Greek Art
Greek Philosophy

The Greek religion passed from an unrestrained polytheism into an anticipation of monotheism on the part of the select few, into gross superstition on the part of the many. See:

Olympus
Pantheon
Jupiter
Juno
Apollo
Mercury
Vulcan
Ceres
Venus
Diana
Mars
Minerva
Neptune
Pluto
Greek Religion
Greek Festivals
Games
Olympic Games
Mysteries

For the Historians:

Herodotus
Thucydides
Xenophon
Plutarch
Polybius
Dio Cassius
Dionysius of Halicarnassus
Arrianus
Theopompus
Diodorus Siculus
Curtius, E.
Finlay, G.
Grote, G.
Schliemann, H.

7. Rome.

Greek civilization was imposed on the peoples of Europe, Northern Africa, and Western Asia by the armies of Rome, whose origin goes back to a settlement of Latin outlaws and shepherds on one of the seven hills south of the Tiber. A legendary kingdom gives way, about the beginning of the sixth century B. C., to a republican

form of government. A long contest between privileged and non-privileged classes results in the elaboration of a splendidly efficient system of municipal government. See:

(*a*) For the Land and the People:

Rome
Italy
Latium
Italic Languages
Latini
Etruria
Samnites

(*b*) For the Cities:

Rome
Alba Longa
Veii
Tarentum
Capua
Naples
Brindisi
Pompeii
Herculaneum

(*c*) For the Kingship and the Struggle between Classes:

Romulus
Numa Pompilius
Tarquinius
Comitia
Patrician
Plebeians
Consul
Tribune
Prætor
Censor
Ædiles
Senate
Decemviri
Hortensius
Licinian Rogations

With her internal problems settled, Rome enters upon a career of foreign conquest and by means of her splendid military art and unscrupulous diplomacy makes herself mistress of Latium, of Italy, and, after a struggle with Carthage, with Macedonia, and with Syria, of the Mediterranean basin. Unchecked power, however, brings corruption within the State, republican institutions tend to become empty forms, factional strife breaks out, the Senate rules for a while and then succumbs to the ambition of masterful politicians; in the conflict of parties the Republic meets its end. See:

Gaul
Camillus
Pyrrhus
Carthage
Punic Wars
Hamilcar
Hasdrubal
Hannibal
Hispania
Cannæ
Zama
Scipio
Macedonia
Antiochus
Gracchus
Agrarian Laws
Jugurtha
Marius
Sulla
Pompeius
Mithridates
Cicero
Catiline
Cæsar
Cassius
Brutus
Crassus
Antonius
Cleopatra
Actium

The Roman Empire, established by Augustus before the beginning of the present era, attained its greatest extent in the early years of the second century of that era and entered on its decline towards the end of the same century. At its height it embraced within its limits the classic world. Peace, excellent means of communication, and an unrivalled administrative system brought the different parts of the Empire close together and facilitated the spread of Greek culture and later of Christianity. The decline of the Empire, due to the decay of old age and the onset of the barbarian tribes of Northern Europe, is arrested by the reforms of Diocletian and of his successor Constantine the Great, who, in the beginning of the fourth century, makes Christianity the State religion. See:

Augustus
Tiberius
Caligula
Claudius
Nero
Vespasian
Titus
Domitian
Trajan
Hadrian
Antoninus Pius
Aurelius
Commodus
Severus, Septimius
Caracalla
Severus, Alexander
Aurelianus
Diocletian
Prætorian Guard
Constantine the Great
Christianity

After Constantine the decline is precipitate. The ancient Roman prowess is gone, and the defence of the Empire is entrusted to barbarian mercenaries; the task of government becomes too heavy for one man, and the Empire is divided in two. The wave of barbarian migration breaks with full force upon the Western Empire, and the last emperor of Latin Rome is dethroned in 476. See:

Migration
Parthia
Julian
Theodosius
Stilicho
Alaric
Attila
Huns
Goths
Vandals
Burgundians
Odoacer
Ravenna
Honorius
Augustulus
Aëtius

The Romans were preëminent for their political genius; their literature, in part, their philosophy, and their art were copies of the Greek, and the general culture at the time of the Empire's zenith was Hellenistic; their gods, too, were largely borrowed or adapted from the Greek pantheon; but in administration and law they were unexampled innovators and in these fields they influenced subsequent European civilization mightily. See:

(*a*) For the Religion:

Roman Religion
Jupiter
Janus
Mars

Quirinus
Vesta
Auguries and Auspices
Flamens
Lupercalia
Salii

(*b*) For the Language and Culture:
Italic Languages
Latin Language
Latin Literature
Roman Art
Philosophy

(*c*) For Administration and Law:
Civil Law
Justinian
Twelve Tables
Jus Gentium
Municipality
Papinianus
Paulus
Pandects

(*d*) For the Historians:
Ammianus Marcellinus
Annals
Appianus
Eutropius
Ferrèro, G.
Gibbon, E.
Ihne, W.
Livy
Merivale, C.
Mommsen, T.
Niebuhr, B. G.
Sallust
Suetonius
Tacitus

B. Mediæval History

1. The East Roman or Byzantine Empire continued to exist for a thousand years. Within the limits of the Western Empire the Germanic tribes settled as masters, and from their gradual amalgamation with the conquered Roman provincials date the beginnings of the modern peoples of Europe. The most powerful of the barbarian kingdoms, that of the Franks, attained imperial extension under Charles the Great, who, by his alliance with the Pope, established the connection between Empire and Church, which was to become one of the most powerful determinants of events in the Middle Ages. See:

(*a*) For the Migrations:
Migration
Britannia
Angles
Saxons
Jutes
Gaul
Burgundians
Franks
Hispania
Suevi
Vandals
Italy
Goths
Theodoric
Lombards
Saracens

(*b*) For the East Roman Empire:
Byzantine Empire
Justinian
Belisarius
Narses

(*c*) For the Frankish Empire:

Clovis
Merovingians
Carolingians
Brunhilda
Fredegunda
Charles Martel
Pepin the Short
Donation of Pepin
Charles the Great
Papal States
Salic Law

2. On the death of Charles the Great the Frankish Empire falls apart. Two great kingdoms arise, France and Germany. The Germans make their power supreme in Central Europe and in Italy, and a German king is crowned Holy Roman Emperor, reviving the connection between Church and State established by Charles the Great. A second Teuton stock, the Northmen, appear as conquerors in France, England, Italy, and Russia. The growth of nations proceeds rapidly, and from the relations between conqueror and conquered develops Feudalism. The young nations are brought into conflict with the growing power of the Church, which, under the leadership of the Bishop of Rome, seeks to raise the ecclesiastical power above the secular. The break-up of the Mediæval ages begins with the Crusades. See:

(*a*) For the Growth of Nations:

Franks
Verdun, Treaty of
France
Neustria
Germany
Austrasia
Franconia
Swabia
Alemanni
Otho the Great
Holy Roman Empire
Normans
Normandy
Varangians
England
William the Conqueror
Italy
Sicily
Guiscard
Russia

(*b*) For Mediæval Society:

Feudalism
Feud
Livery
Homage
Knight
Chivalry
Esquire
Heraldry
Serf
Ordeal
Truce of God
Compurgation

(*c*) For the Struggle between Church and State:

Gregory VII
Investiture
Hohenstaufen
Guelphs and Ghibellines
Henry IV of Germany
Henry V of Germany
Papacy
Innocent III
Philip II of France
Philip IV of France
John of England
Henry II of England
Frederick I Barbarossa
Frederick II of Germany

(*d*) For the Crusades:

Crusades

Papacy
Hospitalers
Templars
Teutonic Knights
Peter the Hermit
Urban II
Godfrey de Bouillon
Bohemund
Tancred
Baldwin
Antioch
Richard I of England
Saladin
Venice
Dandolo
Louis IX of France
Latin Kingdom of Jerusalem

3. The Crusades were followed by a great increase in the commerce of Western Europe and the rise of an influential burgher class, with whose aid the kings succeeded in making themselves independent of the feudal nobility. With the growth of centralized kingdoms the power of the Papacy declines. Contact with the East and the ancient world stimulated the European mind, and the Revival of Learning, the succession of great geographical and astronomical discoveries, and the invention of gunpowder and printing hasten the transition from the Middle Ages to modern times. The uniformity of European society, characteristic of the Middle Ages, is broken up by the Reformation. See:

(*a*) For Commerce, Discoveries, and Inventions:

Hanseatic League
Gunpowder
Printing
Copernicus
Columbus
Gama, Vasco da
Venice
Genoa
Henry the Navigator
Africa
America

(*b*) For the Decline of the Papacy:

Boniface VIII
Avignon
Schism, Great
Constance, Council of
Basel, Council of

(*c*) For the Revival of Learning and the Renaissance:

Petrarch
Bracciolini
Guarino
Poliziano
Lorenzo de' Medici
Erasmus
Colet
Grocyn
Linacre
More, Thomas
Reuchlin
Hutten, Ulrich von
Epistolæ Obscurorum Virorum
Renaissance Art

(*d*) For the Reformation:

Reformation
Wiclif
Huss
Luther
Charles V
Augsburg Confession
Melanchthon
Schmalkaldic League
Zwingli
Calvin
Huguenots
Henry VIII of England
Wishart
Knox

Counter-Reformation
Trent, Council of
Thirty Years' War

For the Historians:

Creighton, M.
Denifle, F. H.
Emerton, E.
Fisher, G. P.
Fleury, Claude
Gieseler, J. K.
Hallam, H.
Harnack, Adolf
Hefele, K. J.
Lea, H. C.
Neander, J. A.
Pastor, L.

C. Modern History

At the opening of the modern era the process of State formation in Europe had resulted in the establishment of firmly centralized nations in England, France, and Spain. Germany and Italy, on the contrary, were disunited, and destined so to remain till the later years of the nineteenth century. The conflicts of States and nationalities is one of the great features of modern times; till 1648 religion is a fruitful cause of external warfare and civil strife; after 1648 wars are fought on political and commercial grounds. The disappearance of a common Church and of Latin as the common vehicle of communication among the higher classes tended to intensify the differentiation of national characteristics. The burgher class, which had begun to assert itself in the period after the Crusades, rose to full recognition in the life of the State and in turn was forced to render recognition, after the French Revolution, to the lowest classes in the State, artisans and peasants. The Church loses control over the temporal affairs of its members, and even in the spiritual field its authority is subordinated to that of the State. Life takes on a predominantly secular tinge; science broadens the intellectual horizon, and commerce and colonization bring the non-European part of the Eastern Hemisphere within the sphere of European influence. The history of modern times is best studied in the history of the various nations.

1. England.

The Britannia of the Romans is overrun in the age of migrations by Teutonic tribes from Jutland and the northwest of Germany, who, receiving a new infusion of kindred blood from the Danes, are conquered in the eleventh century by a more remote kinsfolk, the Normans—Gallicized Teutons from France. Saxons and Normans are blended into one before 1400, by which time a constitutional system of government, worked out in the course of long conflicts between rulers and subjects, is in force, based on the supreme legislative authority of a Parliament, representing the different estates. Wales and Ireland have been subdued, and Scotland has ceased to be a dangerous rival. Feudalism, never so strong in England as on the Continent, is practically destroyed during the Wars of the Roses in the fifteenth century, and the modern era may be dated from the accession of the Tudors in 1485. See:

England
Britannia
Anglo-Saxons
Heptarchy
Alfred
Edward the Confessor
Canute
Harold
Witenagemot
William the Conqueror
Hastings, Battle of
Hereward
Domesday Book
William II
Henry I
Stephen
Plantagenet
Henry II
Becket
Ireland
English Pale
Richard I
John
Magna Charta
Oxford, Provisions of
Montfort, Simon de
Edward I
Parliament
Wales
Llewellyn ap Griffith
Scotland
Wallace
Bruce
Bannockburn
Edward II
Mortimer, Roger de
Edward III
Hundred Years' War
Crécy
Poitiers
Black Death
Richard II
Tyler's Rebellion
Ball, John
Wiclif
Provisors, Statute of
Præmunire
Mortmain, Statutes of
Lancaster, House of
Henry IV
Agincourt
Henry VI
York, House of
Margaret of Anjou
Cade, Jack
Roses, Wars of the
Edward IV
Warwick, Earl of
Richard III
Tudor

Under the Tudors the power of Parliament greatly declined. The Reformation, initiated by Henry VIII, soon spread beyond the limits the King would set to it, and England became Protestant. Under Elizabeth it was forced to contend against Spain, the champion of Catholicism. With the defeat of Spain, England enters on her career as ruler of the seas and begins the work of founding a new English-speaking nation across the Atlantic. The death of Elizabeth, the last of the Tudors, gives England and Scotland a common sovereign. A revived Parliament asserts its rights successfully against the absolutism of the Stuarts, dethrones them, recalls them, and drives them as enemies of Protestantism once more from the throne, bestowing the crown upon a prince of Dutch blood. The crowns of England and Scotland are united. On the Continent, England takes a leading part in the overthrow of Louis XIV of France and comes out of the struggle more powerful than ever upon the seas. See:

Henry VII

Parliament
Star Chamber
Benevolence
Henry VIII
Boleyn, Anne
Wolsey, Cardinal
Cromwell, Thomas
Reformation
Cranmer
Edward VI
Mary I
Ridley
Latimer
Elizabeth
Supremacy
Mary Stuart
Burleigh
Walsingham
Leicester
Essex
Armada
Drake
Howard
Stuart
James I
Charles I
Petition of Rights
Ship-Money
Strafford, Earl of
Laud
Long Parliament
Grand Remonstrance
Five Members
Pym
Eliot
Hampden
Cromwell, Oliver
Vane, Henry
Blake
Fairfax
Ireton
Scotland
Covenants
Presbyterianism
Montrose, Earl of
Charles II
Clarendon, Earl of
Cabal
Test Acts
Oates, Titus
Shaftesbury, Earl of
James II
Halifax, Earl of
William III
Mary II
Anne
Succession Wars (*Spanish*)
Utrecht, Treaty of
Marlborough, Duke of
Bolingbroke
Harley
Sacheverell

With the accession of the House of Hanover, the supremacy of Parliament is firmly established; cabinet government is developed, and the rule of party is the order—by the Whigs, roughly speaking, to the French Revolution, by the Tories to 1832, by the two or their successors since then, in comparatively rapid alternation. France is defeated and deprived of her Indian and American possessions, but almost immediately England suffers an irreparable loss in the defection of the thirteen colonies. Partial compensation, however, is found in India, where English adventurers build up a new empire. After the French Revolution and the Napoleonic Wars, comes strife between the advocates of reaction and the rising forces of democracy, stimulated by the great industrial revolution. The latter win in 1832, and the subsequent history of England is one of democratic progress within, of conquest and commercial expansion abroad. See:

United Kingdom
Whig and Tory
George IV
Cabinet
South Sea Company
Walpole, Robert
Newcastle, Duke of
Chatham, Earl of
Seven Years' War
Bute, Earl of
Grenville
Townshend
Wilkes, John
North, Lord
Fox, Charles James
Pitt, William
Burke, Edmund
Sheridan, R. B.
Trafalgar
Nelson
Wellington
Peninsular War
Canning
India
Clive
Hastings, Warren
Wellesley, Marquis
Cornwallis, Lord
Dupleix
William IV
Peterloo Massacre
Trade Unions
Russel, Lord John
Grey, Earl (1st, 2d and 3d)
Victoria
Corn Laws
Peel, Robert
Cobden, John
Bright, John
Palmerston, Lord
Derby, Earl
Disraeli
Gladstone
Salisbury, Marquis of
Rosebery, Earl of
Chamberlain, Joseph
Balfour, Arthur
Beresford, Lord C.
Campbell-Bannerman
Law, A. Bonar
Morley, Viscount
Ireland
Tyrconnel
Stewart, Robert
Home Rule
Roman Catholic Emancipation
O'Connell, Daniel
Irish Land Laws
Fenian Society
Redmond, J. E.
Parnell, Charles Stewart
Australia
Canada
Imperial Federation
Edward VII
South African War
French, Sir J. W.
Union of South Africa
War in Europe
Asquith, H. H.
Lloyd-George, D.
Kitchener of Khartum
George V
Churchill, W. S.
Curzon, Earl

For the Historians:

Acton, J. E. E. D.
Bury, J. B.
Clarendon, Lord
Elphinstone, M.
Firth, C. H.
Freeman, E. A.
Froude, J. A.
Fyffe, C. A.
Gairdner, J.
Gardiner, S. R.
Geoffrey of Monmouth

Gildas
Giraldus de Barri
Green, J. R.
Gross, C.
Gwatkin, H. M.
Hallam, H.
Holinshed, R.
Kinglake, A. W.
Kingsford, W.
Lappenberg, J. M.
Lecky, W. E. H.
Lingard, J.
Macaulay, T. B.
McCarthy, Justin
Maitland, F. W.
Napier, W. F. P.
Oman, C. W. C.
Palgrave, F.
Paris, Matthew
Rose, J. H.
Seebohm, F.
Stubbs, W.
Turner, Sharon
Walpole, Spencer
William of Malmesbury

2. FRANCE.

Upon the dissolution of the Frankish Empire in the ninth century, descendants of Charles the Great continue to rule over the land of the Western Franks with a population predominantly Celtic and a language derived from the Latin. This is the beginning of France. The weak Carolingians are replaced by the energetic house of Capet, under which the unification of the country is carried on by such able rulers as Philip II, Louis IX, and Philip IV. The Hundred Years' War is disastrous to the kingdom, but its recovery is rapid under Charles VII and his son, Louis XI, who leave the power of the crown firmly established. Religious wars in the sixteenth century become a factor for anarchy, but feudalism is definitely crushed by Richelieu, and absolutism is established by Louis XIV, under whom France is for fifty years the overweening power in Europe. Absolutism breaks down under Louis XIV's unworthy successors, and the entire ancient fabric of society is swept away by the French Revolution. See:

France
Brittany
Normandy
Burgundy
Flanders
Aquitania
Anjou
Navarre
Franks
Carolingians
Verdun, Treaty of
Capetian Dynasty
Louis VII
Philip II, Augustus
Louis IX
Philip IV, the Fair
Valois, House of
Hundred Years' War
Crécy
Poitiers
John II
Jacquerie
Charles VI
Agincourt
Du Guesclin
Dunois
Joan of Arc
Charles VII
Louis XI
Charles the Bold
Charles VIII

Louis XII
Francis I
Henry II
Huguenots
Catharine de' Medici
Guise
Condé
Coligny
Bartholomew's, Massacre of Saint
Charles IX
Henry III
Politiques
Henry IV
Nantes, Edict of
Sully, Duke de
Louis XIII
Richelieu
Westphalia, Peace of
Mazarin
Maintenon, Marquise de
Louis XIV
Fronde
Parlement
Colbert
Louvois
Turenne
Vendôme, Duke de
Luxembourg, Duke of
Villars
Camisards
Succession Wars
Orleans, Philippe, Duke of
Dubois
Louis XV
Seven Years' War
Pompadour, Marquise de
Du Barry, Countess
Louis XVI
Turgot
Necker
Farmers-General
States-General

The abolition of feudalism by the French National Assembly is followed by the overthrow of the monarchy. Assailed by the rulers of Europe, France retaliates, and its conquering armies carry the gospel of democracy over the Continent. Under Napoleon, France dominates Europe until, defeated by a rising of the European peoples, it is compelled to take back its Bourbon kings. Reaction struggles with the advancing ideals of political and social revolution, and the country witnesses within the century the overthrow of three dynasties and the establishment of two republics. Under Napoleon III, France regains for a brief period its ascendency in European politics, but suffers overwhelming defeat at the hands of a new-created Germany. Her latest history has to do with the slow grounding of republican principles, the adjustment of relations between Church and State and the great war which began in 1914. See:

French Revolution
Assembly, National
Mirabeau
Marie Antoinette
Bastille
National Guard
Lafayette
Bailly
Jacobins
Feuillants
Cordeliers
Barnave
Pétion
Pillnitz
Valmy
Jemappes
Dumouriez
Convention, National
Girondists
Brissot

Roland de la Platière
Vergniaud
Montagnardes
Marat
Danton
Billaud-Varennes
Carnot
Callot d'Herbois
Robespierre
Saint-Just
Vendée
Hébert
Jourdan
Pichegru
Moreau
Barras
Directory
Sieyès
Talleyrand
Josephine
Napoleon I; III
Masséna
Ney
Murat
Davout
Junot
Marmont
Lannes
Soult
Suchet
Victor
Beauharnais
Continental System
Code Napoléon
Separation of Church and State
Louis XVIII
Charles X
Louis Philippe
Guizot
Thiers
Ledru-Rollin
Blanc, Louis
Eugénie-Marie de Montijo
Crimean War
Franco-German War
Bazaine
Favre, Jules
Gambetta
MacMahon
Ferry
Boulanger
Casimir-Périer
Faure
Loubet
Dreyfus, Alfred
Waldeck-Rousseau
Delcassé
Triple Entente
Freycinet
Ribot
Fallières
Jaurès
Poincaré
Viviani
Briand
Gallieni
Joffre
War in Europe

For the Historians:

Chéruel, P. A.
Duruy, V.
Froissart, J.
Guizot, F. P. G.
Hanotaux, G.
Houssaye, H.
Joinville, Jean
Lanfrey, P.
Lavisse, E.
Luchaire, A.
Martin, H.
Michaud, J.
Michelet, J.
Mignet, F. A. M.
Montalembert, C. F.
Rambaud, A. N.
Seignobos, C.

Sorel, A.
Stephens, H. M.
Sybel, H.
Thierry, Amédée
Thierry, Augustin
Thou, J. A. de
Villehardouin, Geoffroy de

3. Germany.

German history, like the history of France, may be dated from the dissolution of the Frankish Empire. Unlike France, Germany knew no unity until the very latest times. The establishment of the Holy Roman Empire in the tenth century connected the political fortunes of Germany with those of Italy and the Papacy, and the history of the empire is but the history of the separate states within the empire. After 1273, the imperial dignity is held, as a rule, by members of the house of Hapsburg, and the imperial interests become more and more Austrian. Disunion is fostered by the Reformation and perpetuated by the Thirty Years' War. In the eighteenth century, Prussia enters into competition with Austria for leadership in the empire, which, after existing for more than eight hundred years, is dissolved by Napoleon in 1805. The quarrel between Prussia and Austria is fought out in the nineteenth century, and the former triumphs. A new German Empire is formed, differing from the Holy Roman Empire in its national character, and, as the strongest military power on the Continent, occupies a leading place in the European system. See:

Germany
Prussia
Bavaria
Saxony
Württemberg
Hanover
Baden
Verdun, Treaty of
Franconia
Swabia
Lorraine
Otho I
Holy Roman Empire
Henry II, IV, VI
Conrad II
Investiture
Gregory VII
Hohenstaufen
Guelphs and Ghibellines
Frederick I, Barbarossa
Frederick II
Hapsburg
Rudolph I
Austria-Hungary
Charles IV, V, VI
Golden Bull
Electors
Sigismund
Maximilian I
Aulic Council
Reformation
Passau, Treaty of
Bohemia
Thirty Years' War
Leopold I
Pragmatic Sanction
Frederick William I, III, IV
Frederick II
Maria Theresa
Succession Wars (*Austrian*)
Seven Years' War
Francis II of Austria
Stein
Scharnhorst
Blücher
Gneisenau
Leipzig, Battles of

Waterloo
Vienna, Congress of
Metternich
Burschenschaft
Zollverein
Frankfort, Council of
Seven Weeks' War
Bismarck-Schönhausen
Moltke
William I
Kulturkampf
Triple Alliance
William II
Caprivi
Hohenlohe
Bülow
Bethmann-Hollweg
Jagow
Hindenburg
Tirpitz
War in Europe

For the Historians:

Bulle, K.
Dahlmann, F. C.
Dahn, F.
Droysen, J. G.
Dümmler, E.
Erdmannsdörffer, B.
Gfrörer, A. F.
Giesebrecht, F. W. B
Häusser, L.
Janssen, J.
Lamprecht, K.
Marcks, E.
Maurenbrecher, W.
Müller, Johannes
Oncken, W.
Ranke, L.
Raumer, F. L.
Sybel, H.
Treitschke, H.
Waitz, G.

4. AUSTRIA-HUNGARY.

Austria-Hungary is a political unit merely and in no sense a national State, and its history is largely that of the several states that compose it. The relationship to European affairs resulting from the close connection between the house of Austria and the Holy Roman Empire, for five centuries, is best traced under GERMANY, which see. Here, the internal affairs alone will be touched upon, and the history may be summed up in the history of a family, the Hapsburgs, that, starting with small territorial possessions in the Swabian mountains, brought under its sway by conquest or marriage the heart of Central Europe, from the Carpathians to the Alps and from the Vistula to the Danube and the Adriatic Sea. See:

(*a*) For Austria:

Austria-Hungary
Bohemia
Dalmatia
Styria
Moravia
Galicia
Tyrol
Carinthia
Carniola
Babenberg
Ottokar II
Hapsburg
Rudolph I
Albert II
Maximilian I
Charles V
Ferdinand I, II
Maximilian II
Thirty Years' War
Succession Wars (*Spanish*)
Eugéne, Prince
Joseph II

Leopold II
Campo-Formio
Lunéville
Pressburg
Vienna, Congress of
Metternich
Francis II
Francis Joseph I
Windischgrätz
Radetzky
Lombardy
Seven Weeks' War
Ausgleich
Triple Alliance
War in Europe

(*b*) For Hungary:

Hungary
Arpad
Báthory
Louis I, II
Sigismund
Hunyady, János
Matthias Corvinus
Mohács
Zápolya
Tokòlyi
John III, Sobieski
Rákóczy
Deák, Ferencz
Batthyányi
Kossuth
Bem
Dembinski
Görgey
Mészáros
Klapka
Haynau
Tisza

(*b*) For the Historians:

Arneth, A. R.
Fessler, I. A.
Gindely, A.
Hormayr, J.
Krones, F.
Mailáth, J.
Zeissberg, H.
Wolf, Adam

5. The Iberian Peninsula.

One of the richest regions of the Roman Empire, Hispania, was wrested from the Romans by successive waves of barbarian invaders in the fifth century of our era. The Christian Gothic kingdom was overthrown by the Arabs, who developed in the peninsula a civilization that was long the highest in Europe. The remnants of the Christian inhabitants rallied in the northern mountains and a slow but steady process of reconquest was begun, hastened by the dissolution of the Arab Caliphate, retarded by strife among the various Christian kingdoms, completed before the end of the fifteenth century, when the greater part of the peninsula had been brought under one crown. Portugal alone preserved its independence of Castile. Enriched by the wealth of a newly discovered world and her Lowland possessions, Spain, in the sixteenth century, plays the leading rôle in European affairs and then enters on a course of political and economic decline which has continued to the present day. Portugal and Great Britain have been friends since the beginning of the eighteenth century. See:

(*a*) For Spain:

Spain
Iberians
Phœnicia
Carthage
Hispania
Lusitania

Goths
Suevi
Roderick
Moors
Tarik
Ommiads
Cordova
Mohammedan Art
Navarre
Asturias
León
Castile
Aragon
Almoravides
Almohades
Granada
Boabdil
Ferdinand V of Castile
Isabella I, II
Ximenes
Inquisition
Cortes
Fuero
Padilla, Juan
Alcántara
Calatrava
Gonsalvo de Cordova
Philip II, III, IV
Armada
Charles, II, IV
Succession Wars (*Spanish*)
Alberoni
Farnese
Godoy
Peninsular War
Ferdinand VII
Carlos, Don
Maria Christina
Espartero
Narváez
Prim
O'Donnell
Castelar
Serrano
Amadeus I
Alfonso XII, XIII
Cánovas del Castillo
Sagasta
Silvela
Spanish-American War

(*b*) For Portugal:

Portugal
Alfonso I, V
Diniz
John I, III
Henry the Navigator
Manuel the Great
Gama, Vasco da
Almeida
Albuquerque
Braganza, House of
Methuen Treaty
Pombal
Peninsular War
Miguel, Dom
Pedro, Dom
Saldanha
Charles I
Brazil
Manuel I, II
War in Europe

(*c*) For the Historians, see:

Barros, J. de
Coxe, W.
Dozy, R.
Gayangos
Lafuente, M.
Lea, H. C.
Llorente, J. A.
Mariana, J.
Prescott, W. H.
Robertson, W.
Zurita Y. Castro

6. Italy.

The fall of the Western Empire was followed by a struggle between the

Goths and the Byzantines for the possession of Italy. The latter held the south while the north passed from the Goths to the Lombards and the Franks. Constituted with Germany into a shadowy Holy Roman Empire, Italy enters upon a period of utter disunion with the Papal power established in the centre of the peninsula, the north parceled out into independent principalities and republics, the south ruled by Normans, Saracens, French, and Spaniards. The Italian cities rise to great prosperity after the Crusades and become the cradle of the Renaissance. The state of political disintegration continues till the later part of the nineteenth century and Italy suffers from internal strife and foreign domination, Spain and Austria playing the master in the greater part of the peninsula. Union comes to the country from the house of Savoy, whose power, spreading over Sardinia and Piedmont, after a contest with Austria, the Papacy, and Spain, spreads over the entire peninsula. Early Italian history is best studied in the story of separate states and celebrated families. See:

Rome
Venice
Florence
Milan
Genoa
Pisa
Lucca
Verona
Bologna
Ravenna
Ferrara
Naples
Papal States
Two Sicilies, Kingdom of
Sicily
Foscari
Falieri
Malatesta
Medici
Visconti
Colonna
Orsini
Este
Borgia
Theodoric the Great
Belisarius
Narses
Lombards
Saracens
Normans
Guiscard
Crusade
Reniassance
Charles VIII of France
Sforza
Condottieri
Louis XII of France
Ferdinand V of Spain
Julius II (Pope)
Savoy
Napoleon I
Suvaroff
Nelson
Murat
Carbonari
Holy Alliance
Victor Emmanuel I, II, III
Charles Albert
Mazzini
Young Italy
Radetzky
Manin
Cavour
Garibaldi
Villafranca
Rattazzi
Ricasoli
Crispi
Rudini

Depretis
Humbert I
Mafia
Turco-Italian War
Salandra
Sonnino
War in Europe

For the Historians:

Amari, M.
Balbo, C.
Botta, C. G.
Burckhardt, J.
Cantù, C.
Cibrario, G. A.
Farini, L. C.
Gallenga, A.
Gregorovius, F.
Hodgkin, T.
Johnston, R. M.
La Farina, G.
Liudprand
Muratori, L. A.
Paulus Diaconus
Sismondi, J. C.
Symonds, J. A.
Villari, P.

7. The Slav Empire.

The Slav inhabitants of the plains south of the Finnish lakes received in the ninth century a ruler of Scandinavian stock, whose successors extended their sway to the southern rivers. The Byzantine civilization and religion are introduced. The unity of the country disappears after the tenth century, and its independence is swept away in the thirteenth by Mongol invaders from the east. The power of the Mongols breaks up in the fifteenth century and a new empire is created by the grand princes of Moscow, whose rule is steadily extended to the south and west at the expense of Poland and the Baltic powers. Peter I brings Russia within the sphere of European politics and gains for his country a predominant place among the northern powers. With the Baltic reached, Russia turns once more to the south and driving the Turks before her, she reaches the Black Sea and seeks to press into the Balkan peninsula. The jealousy of the powers halts her progress and her advance assumes a new direction—eastward and southward in Asia, where the beginnings of her power had been made in the sixteenth century. In her attack on the integrity of the Chinese Empire, she finds a formidable rival in Japan. Internally, after Peter's time, a struggle goes on between the Eastern and Western civilization, which, at the beginning of the twentieth century, finds Russia still a despotism. Poland, at one time the greatest power in central Europe, fell through disunion and its territory was absorbed by Austria, Prussia, and, to the largest extent, by Russia. See:

(*a*) For Russia:

Russia
Slavs
Varangians
Rurik
Novgorod
Kiev
Vladimir
Tchernigov
Batu Khan
Alexander Nevski
Moscow
Kiptchak
Ivan III, the Great
Ivan IV, the Terrible
Godunoff, Boris
Demetrius

Romanoff, House of
Peter I, the Great
Streltsi
Charles XII of Sweden
Anna Ivanovna
Dolgoruki
Golitzin
Biron
Anna Karlovna
Elizabeth Petrovna
Catharine II
Poland
Armed Neutrality
Paul I
Alexander I
Tilsit
Holy Alliance
Nicholas I
Crimean War
Alexander II
Serf
Nihilism
Russo-Turkish War
Berlin, Congress of
Loris-Melikoff
Alexander III
Ignatieff
Anti-Semitism
Nicholas II
Finland
Siberia
Manchuria
Russo-Japanese War
Goremykin
Nicholas (Nikolai Nikolaievitch)
War in Europe

(*b*) For Poland:

Poland
Lithuania
Teutonic Knights
Casimir III, the Great
Jagellons
Casimir IV
Sigismund the Great
Ukraine
Cossacks
Chmielnicki
Thorn
John III, Sobieski
Succession Wars (*Polish*)
Stanislas Leszczynski
Augustus II
Catharine II
Kosciuszko
Chlopicki
Bem
Dembinski
Panslavism
Aksakoff, I. S.
War in Europe

For the Historians:

(*a*) Bestuzheff-Ryumin, K. N.
Brückner, A.
Karamzin, N. M.
Kostomaroff, N. I.
Pogodin, M. P.
Rambaud, A. N.
Solovieff

(*b*) Chodzko, L. J.
Lelewel, J.
Niemcewicz, J. U.

8. The Balkan Peninsula.

The Byzantine Empire, successor to the Roman Empire in the eastern Mediterranean, after a thousand years' existence, fell before the Turks, whose power, spreading northward beyond the Danube, extended over Hungary and threatened the Austrian dominions. The rapid decline of the Turks begins with the eighteenth century and has continued to the present day, resulting in the restriction of the Ottoman power to but a fraction of its once vast territories. Russia and Austria have stead-

ily pressed the Turkish power backward, and only the jealousy of the Western powers, England primarily, has preserved the integrity of the Empire. Part of the territory wrested from Turkey has been erected into independent Christian States. In 1908 the Young Turk movement overthrew the old order of things and established a constitutional government. In the Great War Turkey divorced herself from England and cast in her lot with the Teutonic allies. See:

(*a*) Turkey

Eastern Question
Othman
Amurath I
Janizaries
Bajazet I
Amurath II
Mohammed I
Mohammed II
Mohammed III
Mohammed IV
Mohammed V
Selim I
Solyman
Lepanto
Kiuprili
Kara Mustapha
Eugène, Prince
Mahmud II
Mehemet Ali
Crimean War
Abd ul-Aziz
Abd ul-Hamid
Russo-Turkish War
Berlin, Congress of
Greece
Crete
Armenia
Albania
Ali Pasha
Macedonia
Adrianople
Constantinople
Abd ul-Medjid
Turco-Italian War
Balkan War
War in Europe

(*b*) Greece

Hetæræ
Coray
Ypsilanti
Mavrocordatos
Miaulis
Kanaris
Bozzaris
Kolokotronis
Capo d'Istria
Navarino
Otto I
George I
Trikoupis
Delyannis
Trikoupis, C.
Constantine I
Balkan War
Venizelos
Zaimis
War in Europe

(*c*) Servia

Czerny George
Obrenovitch
Alexander Karageorgevitch
Milan I
Natalie
Ristic
Alexander I
Peter I, Karageorgevitch
Skupshtina
Bosnia
Herzegovina
Berlin, Congress of
Panslavism
Balkan War
Pashich

War in Europe
Mijatovich

(*d*) Bulgaria
Bulgars
Russo-Turkish War
Alexander I
Ferdinand I
Stambuloff
Berlin, Congress of
Balkan War
Panslavism
War in Europe

(*e*) Rumania
Moldavia
Wallachia
Kantemir
Hospodar
Fanariots
Ypsilanti
Ghika
Russo-Turkish War
Jews
Berlin, Congress of
Bratianu
Charles I
Balkan War
Panslavism
Ferdinand (Rumania)
War in Europe

(*f*) Bosnia

(*g*) Herzegovina

(*h*) Montenegro
Berlin, Congress of
Danilo I
Panslavism
Balkan War
Scutari
Nicholas I
War in Europe

(*i*) Albania
Balkan War
Essad Toptani
William of Wied
War in Europe

For the Historians:
Creasy, E. S. (Turkish)
Hammer-Purgstall (Turkish)
Lambros (Greek)
Trikoupis, S. (Greek)
Ranke, L. von. (Servian)
Mijatovich, C. (Servian)
Jirecek, K. (Bulgarian)
Iorga, N. (Rumanian)

8. The Minor Nations of Europe.

(*a*) Denmark
Margaret
Christian VII
Christian VIII
Christian IX
Christian X
Schleswig-Holstein
Frederick III
Frederick V
Frederick VI
Frederick VII
Frederick VIII
Norway
Oscar II
War in Europe

(*b*) Sweden
Finland
Eric
Kalmar
Sture
Gustavus Vasa
Charles IX
Gustavus Adolphus
Oxenstierna
Christina
Charles XII
Gustavus I-V
Caps and Hats
Charles XIV, John

Oscar I, II
Adolphus Frederick
War in Europe

(*c*) Norway
Normans
Harald Haarfagr
Iceland
Haakon
Denmark
Christian II, IV, VII
Frederick I, II
Haakon VII
Olaf
War in Europe

(*d*) Netherlands
Burgundy
Granvella
Margaret of Parma
William the Silent
Egmont
Hoorne
Alva
Farnese, Alexander
Barneveldt
Maurice of Nassau
Dort, Synod of
De Witt
Stadtholder
William III
Louis XIV
Wilhelmina
War in Europe

(*e*) Belgium
Flanders
Brabant
Walloons
Netherlands
Ostend Company
Frère-Orban
Rogier
Leopold I, II
Albert I
Vandervelde
Liége
Namur
Ostend
War in Europe

(*f*) Switzerland
Helvetii
Alemannia
Burgundy
Hapsburg
Tell, William
Morgarten
Sempach
Winkelried
Morat
Zurich
Hofer, Andreas
Sonderbund
War in Europe

For the Historians:
Blok, P. J. (Dutch)
Fryxell, A. (Swedish)
Geijer, E. (Swedish)
Juste, T. (Belgian)
Merle D'Aubigné (Swiss)
Motley, J. L. (Dutch)
Munch, P. A. (Norwegian)
Nielson, Y. (Norwegian)
Steenstrup, J. C. H. R. (Danish)

10. South America and Mexico.

Beginning with Mexico in 1519, the great regions of Central and South America were rapidly brought under Spanish rule, Portugal, however, held sway in Brazil, and in Guiana small portions fell to other European nations. The harsh Spanish rule led to bitter but unsuccessful uprisings among the Indian tribes of Peru and Chile. The first quarter of the nineteenth century witnessed the successful revolt of the Spanish dependencies, aided in their struggle by the decidedly

friendly attitude of Great Britain and the United States, of whom the latter now assumes the rôle, largely, of protector over the newly established republics. A decided inaptitude for self-government is evinced by these, and chronic disorder checks national development. Chile, Argentina, and Mexico are, however, prominent exceptions. Brazil, after living tranquilly as an independent empire, enters upon the troubled career of republican politics towards the end of the nineteenth century. The influence of the United States in South America becomes an important factor with the completion of the work of building the Panama Canal. See:

Mexico
Mexican Archæology
Montezuma
Cortés
Mendoza, Antonio de
Hidalgo, Miguel
Morélos
Itúrbide
Guerrero, Vicente
Santa Anna
Mexican War
Comonfort
Juarez
Miramon
Almonte
Maximilian
Lerdo de Tejada
Diaz, Porfirio
Villa
Huerta
Madero
Zapata
Central America
Guatemala
Nicaragua
Zelaya
Honduras
Salvador
Costa Rica
Morazán
Carrera, Rafael
Walker, William
Peru
Huayna Capac
Pizarro, Francisco
Pizarro, Gonzalo
Almagro
San Martin, José de
Prado, M. I.
Bolivia
Chile
Araucania
Valdivia, Pedro de
Carrera, José Miguel de
O'Higgins, Bernardo
San Martin, José de
Balmaceda, José Manuel
Argentina
Rosas, Juan Manuel
Urquiza, Justo José
Mitre, Bartolomé
Sarmiento, Domingo F.
Uruguay
Gauchos
Artigas, Fernando José
Flores, Venancio
Paraguay
Guaraní
Francia, José Gaspar
Lopez, Francisco Solano
Colombia
Ecuador
Venezuela
Castro, C.
Miranda, F.
Bolivar, Simon
Paez, José Antonio
Brazil
Pedro I, II
Fonseca, Deodoro da

For the Historians and Investigators, see:

Ixtlilxochitl
Prescott
Bancroft, H. H.
Bandelier, A. F. A.
Charnay, C. J. D.
Squier, E. G.
Markham, C. R.
Vicuña-Mackenna, Benjamin

11. The Far East.

(1) India. The history of India may be divided into three periods, that of the early Hindu domination, the period of Moliammedan rule, and the period of European supremacy. See:

(*a*) For the Peoples:

India
Indian Peoples
Aryan
Dravidians
Tamils
Telugus
Kanarese
Malayalim

(*b*) For the History:

India
Bimbisara
Sandrocottus
Ghaznivides
Timur
Baber
Akbar
Shah Jehan
Aurungzebe
Nadir Shah
Ahmed Shah
Gama, Vasco da
Albuquerque
Almeida
Pondicherry
Goa
Dupleix
Clive
East India Company
Hastings, Warren
Cornwallis, Lord
Wellesley, Marquis of
Nana Sahib

For the Religions of India, see Chapter on Religion.

(2) China. China presents the spectacle of a nation which, having attained a high degree of civilization at a time when Europe was still barbarian, has been content to remain quiescent while the world has moved forward. In spite of its vast latent strength, it seems destined to become the prey of European ambitions, unless the example of its kindred nation, Japan, should lead it to recognize the civilization of the West, and to observe the preponderant rôle that should be its own in the Orient. See:

China
Fuh-hi
She Hwang-Ti
Han
Genghis Khan
Kublai Khan
Ta Ts'ing
K'ang-hi
Hung-siu-ts'euen
Gordon, Charles George
Li Hung Chang
Kwang-Sü
Far Eastern Question
Tze-hsi
Yuan Shih-kai

For the Philosophy and Religions of China, see Chapter on Religion.

(3) Japan. Among the nations of the East, Japan stands forth as an amazing exception to Eastern immobil

ity. The political balance in the Pacific has been quite upset by the appearance of this new power, which, in less than four decades, has passed from feudalism and Oriental seclusion to a constitutional government and the skilful utilization of the sciences and wisdom of the West. Japan's triumph over China in 1894-95 first marked strength; its magnificent struggle against Russian aggression in China and its participation in the Great War raised the possibility of a quite unexpected development in the relations between Europeans and Mongolians. See:

Japan
Jimmu Tennō
Taira
Samurai
Minamoto
Fujiwara
Yoritomo
Ashikaga
Daimio
Nobunaga
Hideyoshi
Iyeyasū
Tokugawa
Iyemitsu
Perry, M. C.
Kéiki
Mutsuhito
Arisugawa
II Kamon no Kami
Itagaki, Taisüke
Ito, Hirobumi
Iwákura, Tomomi
Okubo, Toshimichi
Okuma, Shigenobu
Soyeshima Tanéomi
Yamagata Aritomo
Kato
Yoshihito
War in Europe

See also:

Nichiren
Arai Hakuseki (1657—)
Motoori Norinaya (1730—)
Hokusai (1760—)
Fukuzawa, Yukichi
Kido, Takayoshi

For the Authorities, see:

Abeel, D.
Beal, S.
Biot, E. C.
Griffis, W. E.
Hirth, F.
Julien, S. A.
Legge, J.
Morrison, R.

12. The United States.

Norse explorations in North America, about the year 1000, led to no result, and Europe, before the time of Columbus, had no knowledge of a world beyond the Atlantic. The discovery, in 1492, was followed by a period of exploration, in which Spanish, French, English, and Dutch participated. Settlement follows, and poverty and religious persecution in Great Britain stretches a chain of English speaking colonies along the eastern coast of what is now the United States. Swedes and Dutch give way in time, and with Spain restricted to Florida, England enters into a struggle for possession of the interior with France, whose rule has meanwhile been extended over the basins of the St. Lawrence, the Mississippi, and the Great Lakes. England triumphs, and brings under her authority the disputed territory east of the Mississippi. See:

(*a*) The Discoverers:

Ericson

Vinland
Madog
Columbus
Vespucius
Cabot
Cortereal
Verrazano
Ponce de Leon
Ayllon
Narváez, P. de
Nuñez Cabeça
De Soto
Coronado
Drake
Frobisher
Gilbert, Sir Humphrey
Gosnold
Smith, John
Norumbega
Cartier
Champlain
Hudson
Nicollet
Joliet
Marquette
La Salle
Hennepin
Tonty
Lewis, Meriwether
Clark, William
Pike
Long, S. H.
Bonneville
Catlin
Whitney, J. D.
Hayden
Powell, J. W.

(*b*) The Settlers:

See under the names of the thirteen original colonies; also:

London Company
Plymouth Company
Jamestown
Yeardley
Berkeley
Bacon
Bradford, William
Standish
Endecott
Winthrop
Minuit, Peter
Kieft
Stuyvesant
Hooker, T.
Davenport, J.
Williams, Roger
Hutchinson, Anne
Baltimore, Barons of
Claiborne
Friends
Penn
Oglethorpe

(*c*) For the Struggle with the French:

King William's War
Queen Anne's War
King George's War
French and Indian War
Pepperrell, Sir William
Louisburg
Albany Convention
Braddock
Amherst
Abercromby
Loudoun
Wolfe, James
Montcalm
Pontiac
Paris, Treaties of

England's triumph over France is followed almost immediately by the irreparable loss of the thirteen colonies. The injustice of Parliamentary taxation stirs the colonists to resistance, and the memory of their triumph over the French lends them courage for the struggle. See:

(*a*) The Pre-revolutionary Period:

Navigation Laws
Assistance, Writ of
Otis, James
Stamp Act
Sons of Liberty
Boston Massacre
Boston Tea Party
Boston Port Bill
Quebec Act
Adams, Samuel
Hancock, John

(*b*) The Revolution: (1) The Battles:

Lexington
Concord
Bunker Hill
Long Island
Trenton
Princeton
Brandywine
Germantown
Oriskany
Bennington
Saratoga
Monmouth
Camden
Cowpens
Guilford Court House
Eutaw Springs
Yorktown

(2) The Men:

Warren
Putnam
Washington
Montgomery
Arnold
Lee, Charles
Gates
Greene
Conway
Stark
Herkimer
Morgan
Marion
Sumter
Pickens
Lee, Richard Henry
Jones, Paul
Wayne, Anthony
Clark, George Rogers
Lafayette
Rochambeau
Grasse, Count de
Steuben
Kalb, Baron de
Kosciuszko
Pulaski
Howe, Lord
Clinton
Burgoyne
Cornwallis
Tarleton
Jefferson
Franklin, B.
Livingston, R. R.
Deane, Silas
Sherman, Roger
Morris, Robert
Declaration of Independence

The thirteen colonies, having vindicated their independence in a protracted war, are impelled for the defence of their now won liberties, and the furtherance of their common welfare, to organize themselves into a federal republic with a written constitution, in nature essentially a compromise between the ideas of local liberty and efficiency of the central authority. The Liberator of the nation is also its first executive. His death is followed by a struggle between the two constitutional principles. The advocates of "strict construction" triumph, and, in the person of Thomas Jefferson, the Republican-Democratic Party assumes power to hold it uninterruptedly for forty years. The

boundaries of the Union are extended by the admission of new States, and the national territory is enormously increased by the acquisition of Louisiana and Florida. Party differences disappear, for a while, after a second war with Great Britain, but a new cause of dissension appears in the form of the slavery question, which replaces constitutional politics by sectional. See:

(*a*) The Formation of the Union:

Constitution of the United States
Shays's Rebellion
Hamilton
Madison
Jay
Pinckney, C. C.
Wilson, James
Randolph, Edmund
Paterson, William
Henry, Patrick
Northwest Territory

(*b*) The Era of Party Strife:

Federalists
Anti-federalists
Federalist, The
Gallatin, A.
Marshall, John
Burr
Genet
Jay Treaty
Whisky Rebellion
X. Y. Z. Correspondence
Alien and Sedition Laws
Virginia and Kentucky Resolutions
Louisiana Purchase
Lewis and Clark Expedition
Continental System
Orders in Council
Embargo
Chesapeake, The
Constitution, The
Erie, Battle of Lake
Thames, Battle of the
Chippewa
Lundy's Lane
New Orleans, Battle of
Tippecanoe
Hull, Isaac
Hull, William
Lawrence
Perry
Macdonough
Hartford Convention
Cushing, Caleb
Ghent, Treaty of
Missouri Compromise
Monroe, James
Monroe Doctrine

The Democratic Party in the course of time did not fail to adopt many of the principles of the old Federalists, among them notably the national encouragement of internal improvements and the creation of a Government bank. The tendency on the part of a faction to lay stress on these functions of the Government led to the dissolution of the Democratic Party. The Whigs now appear, historically the successors of the Federalists and the predecessors of the Republican Party. The hierarchic succession of presidents ends in 1828, and the Western Democracy triumphs in the person of Andrew Jackson. Sectional feeling, fostered by growing economic differences between North and South, is intensified by the rise in the North of an outspoken spirit of opposition to the institution of slavery. The two political parties for a time eagerly ignore the issue, and Southern statesmen, armed with the threat of a disruption of the Union, succeed in coercing the conservatives in the North.

Territorial expansion, however, forces the slavery question into the foreground; the Whig Party, unwilling directly to challenge the issue, is succeeded by the Republican Party, which will. The Democratic Party is broken in two. With the triumph of the anti-slavery party in 1860, the South secedes from the Union. See:

(*a*) The Formation of Parties and the Rise of the Slavery Question:

Democratic Party
Adams, John Quincy
Crawford, William
Jackson, Andrew
Caucus
Whig Party
Clay, Henry
Cumberland Road
Tariff
Nullification
McDuffie
Calhoun, John C.
Hayne, Robert
Webster
Abolitionists
Garrison, William Lloyd
Phillips, Wendell
Lovejoy, Elijah
Lundy, Benjamin
Van Buren
Marcy, W. L.
Harrison, William Henry
Tyler
Webster-Ashburton Treaty
Northeast Boundary Dispute
Polk
Texas
Houston, Samuel
Oregon
Northwest Boundary Dispute
Mexican War
Wilmot Proviso
Scott, Winfield
Taylor, Zachary
Fillmore
Cass
Clayton-Bulwer Treaty

(*b*) The Final Struggle over Slavery:

Free Soil Party
Compromise Measures of 1850
Fugitive Slave Law
Seward
Sumner
Davis, Jefferson
Underground Railroad
Pierce, Franklin
Kansas-Nebraska Bill
Popular Sovereignty
Thayer, Eli
Republican Party
Douglas, Stephen A.
Taney, Roger
Dred Scott Case
Buchanan, James
Brown, John
Lincoln, Abraham
Breckinridge, J. C.
Bell, John
Constitutional Union Party

(*c*) The Civil War:

Civil War in America
Confederate States of America
Stephens, Alexander
Benjamin, Judah P.
Toombs, Robert

1. The Battles:

I. In the East:

Fort Sumter
Big Bethel
Bull Run
Ball's Bluff
Williamsburg
Seven Pines
Mechanicsville

Gaines's Mill
Savage's Station
Frazier's Farm
Malvern Hill
Bull Run (second)
Antietam
Fredericksburg
Chancellorsville
Gettysburg

II. In the West:

Wilson's Creek
Paducah
Belmont
Fort Henry and Fort Donelson
Pea Ridge
Shiloh
Corinth
Iuka
Island No. 10
New Orleans
Perryville
Stone River
Vicksburg
Chickamauga
Chattanooga
Mobile Bay

III. The Final Campaigns:

Dalton
Kenesaw Mountain
Nashville
Fort McAllister
Bentonville
Wilderness
Spottsylvania Court House
Cold Harbor
Monocacy
Winchester
Cedar Creek
Five Forks
Petersburg
Appomatox Court House

2. The Men:

Grant
Sherman
Sheridan
McClellan
Meade
Thomas
Burnside
Halleck
Hooker
Rosecrans
Buell
Hancock
Pope
Lyon
Foote
Farragut
Lee
Jackson
Johnston
Johnston
Longstreet
Beauregard
Bragg
Hood
Early

(*d*) Emancipation Declaration
Draft Riots

Four years of civil war established the principle that the United States, once perhaps a federation, is now a nation. Slavery is abolished and a partisan Congress, under the stress of circumstances, gives the ballot to the liberated bondsmen. Reconstructed, the Southern States devote themselves to the task of rebuilding their wasted fortunes on old ruins and new conditions. The South recognizes the lesson of the war in its bearing on the nature of our Government, but refuses to recognize the capacity for political and social equality in the negro, and in the last

years of the nineteenth century enters upon a deliberate policy of negro disfranchisement through State legislation. In the North and West, the era is one of extraordinary material growth, and political questions of the time are largely economic—currency, tariff, labor, and monopoly. With the acquisition of the Spanish possessions in the Pacific, and the assumption of the task of building the interoceanic Panama Canal, the United States begins its career as a world power. See:

(*a*) The Restored Union:

Johnson, Andrew
Reconstruction
Freedman's Bureau
Carpet Baggers
Ku-Klux Klan
Knights of the Golden Circle
Force Bill
Tenure of Office Act
Stanton
Alaska
Chase, S. P.
Stevens, T.

(*b*) From the Close of the Civil War Period:

Grant, U. S.
Alabama Claims
Grange
Credit Mobilier of America
Virginius Massacre
Whisky Ring
Electoral Commission
Custer
Modoc
Sioux
Indians
Centennial Exhibition

Hayes, R. B.
Tilden
Strikes and Lockouts
Bland, R. P.
Greenbacks
Greely, H.

Garfield, J. A.

Arthur, C. A.

Harrison, B.
Bering Sea Controversy
Tariff
Hawaiian Islands

Cleveland, G.
Venezuela
World's Columbian Exposition

McKinley, Wm.
Blaine, J. G.
Reed, T. B.
Spanish-American War
Cuba
Philippines
Porto Rico
Trusts
Pan-American Exhibition.

Roosevelt, T.
Hay-Pauncefote Treaty
Panama Canal
Root, E.
Louisiana Purchase Exposition
Russo-Japanese War
Hughes, C. E.
Trusts
Lodge, H. C.
Poindexter, Miles

Taft, Wm. H.
Pugo
Knox, P. C.
Conservation
Trusts
Tariff
Lorimer, Wm.
Aldrich, N. W.

Mexico, *History*
La Follette, R. M.
Cummins, A. B.
Penrose, B.
Borah, Wm.

Wilson, W.
Bryan, Wm. J.
Parker, A. B.
Underwood, O.
Brandeis, L. D.
McAdoo, Wm. G.
Daniels, J.
Reserve Bank, Federal
Mexico, *History*
Tariff
Mann, J. P.
O'Gorman, J. A.
Newlands, F. G.
Kern, J. W.
Owen, R. L.
Gore, T. P.
Smith, Hoke
Stone, Wm.
War in Europe

Party Names
Money
Coinage
Labor Organizations
Arbitration
Railways (Interstate Commerce Act)
Trusts
Tariff

For the Historians:
Adams, C. F.
Adams, H.
Bancroft, G.
Bancroft, H. H.
Beard, C. A.
Brodhead, J. R.
Bryce, James
Burgess, J. W.
Channing, F.
Coffin, C. C.
Curtis, G. T.
Dodge, T.
Doyle, J. A.
Dunning, W. A.
Fiske, J.
Frothingham, R.
Gayarré, C.
Harrisse, H.
Hart, A. B.
Higginson, T. W.
Hildreth, R.
Holst, H. E. von
Johnston, A.
Lodge, H. C.
Lossing, B.
McMaster, J. B.
Palfrey, J. G.
Parkman, F.
Peter Martyr
Rhodes, J. F.
Robinson, J. H.
Ropes, J. C.
Schouler, J.
Shea, J. G.
Sloane, W. M.
Sparks, J.
Thorpe, F. N.
Thwaites, R. G.
Wilson, W.
Winsor, J.

Chapter 2. Law and Political Science

NATIONAL or Municipal law is commonly divided into two general classifications, Substantive Law, and Adjective or Remedial Law. Substantive Law prescribes and defines the normal relations of social and political life, that is, legal rights, obligations, and privileges, as distinguished from violations of the normal, legal order. (See Substantive Law.) Adjective or Remedial Law deals with abnormal conditions, such as crimes, and with the methods of enforcement of legal rights. Both of these classifications are severally divided into Public Law and Private Law. The title, Public Law, is applied to those subjects which have to do with the relations of individuals to the various branches of government. Private Law includes the rules governing the relations of individuals to each other, and their rights in and over property. While, for some purposes, Substantive and Remedial Law are so closely connected that a complete knowledge of one is not possible without an acquaintance with the other, yet, in general, it may be said that, for practical purposes, the average layman is concerned chiefly with the rules of Substantive Law, except, perhaps, Public Remedial Law—the Law of Crimes. For example, it is quite necessary that a person in business be somewhat familiar with the ordinary principles of the Law of Contracts, but it is not necessary that he should know how to proceed in law to obtain redress for the breach of a contract.

International Law is distinguished from Municipal Law, in that the former deals with the relations of nations with each other, and such rules of law as will be recognized by nations in dealing with the citizens of each other, while the latter deals with the relations of one nation to its citizens, and the relations of the citizens with each other. International Law is administered, generally, in the various courts of each nation when applicable, but the refusal of a nation to recognize any of its principles could only be met by a declaration of war on the part of the aggrieved nation or nations, whereas the sovereign power of a nation sanctions and enforces Municipal or National Law. Therefore, to avoid confusion, topics in International Law are placed in a separate classification.

For a General Discussion of the Nature and Purposes of Law, see:

Law
Jurisprudence
Substantive Law
International Law
Municipal Law
Mercantile Law
Military Law

A. Substantive Law

I. Public Substantive Law.

This branch of substantive law is commonly divided into two general classifications, Constitutional and Administrative Law. Constitutional law deals with the nature and powers of the Government, and correlatively with

the rights and privileges of citizens with reference to the Government. The name, ADMINISTRATIVE LAW, is applied to that portion which controls and regulates the enforcement of the will of the Government, as expressed by constitutions, statutes, etc.

1. CONSTITUTIONAL LAW:

Constitution
Constitutional Law
Constitution of the United States
Magna Charta
Amendment
Federal Government
Police Power
Veto
Eminent Domain
Bill of Rights
Civil Rights Bill
Bill of Attainder
Sovereignty
State
Ex post facto
Retroactive
Due Process of Law
Congress
Legislature
Legislation
Conflict of Laws
Act
Act of Parliament
Repeal
Citizen
Alien
Naturalization
Allegiance
Domicile
Alien and Sedition Acts
Expatriation
Expulsion
Liberty of Individual
Liberty, Religious
Emancipation
Reprieve
Territories
Consolidation Acts
Restraint of Trade
Interstate Commerce Act
Granger Cases
Concurrent Jurisdiction
Original Package
Income Tax
Inheritance Tax
Dartmouth College Case
Slaughter-House Cases
Dred Scott Case
Fugitive Slave Law
Homestead Laws
Poor Laws
Tenure of Office Act
Legal Tender Cases
Debt, Public
Convention
Election
Vote
Fishing Laws
Franchise

2. ADMINISTRATIVE LAW:

Administrative Law
Executive Department
State, Department of
Diplomacy
High Commission
Commission
Commissioner
Municipality
Municipal Government
Municipal Law
Municipal Ownership
Municipal Reform Acts
Civil Administration
Court
Supreme Court of U. S.
Courts, Military
Court Baron
Court of Session

County Court
Common Bench
Probate Court
Petty Sessions
District Court
Sheriff's Court
Ecclesiastical Court
King's Bench
Cassation, Court of
Claims, Court of
Instance, Court of
Inns of Chancery
Inns of Court
Ordinance
By-law
Charter
Building Acts
Cemetery Laws
Factor's Acts
Intoxicating Liquors
Grand Jury
Justice, Lord
Sheriff
Justice of the Peace
Marshal
Coroner
Assessors
Auditor
Alderman
Attorney-General
Surrogate
Judge-Advocate
Judge
Referee
Justice
Justice, Department of
Justice of the Peace
Appointment

II. Private Substantive Law

For convenience this portion of the substantive law is divided into two classifications, the Law of Persons and the Law of Property.

1. Law of Persons:

In law, both natural persons and those creations of the law, such as corporations, known as legal entities, or juristic persons, are classed together in the Law of Persons, as the same general principles apply to them. Under the title Natural Persons, are grouped titles dealing with the peculiar privileges and disabilities of married women, infants, and persons of unsound mind. Topics dealing with the family relation are for convenience grouped together.

(*a*) *Natural Persons*:

I. Persons Exercising Incomplete or Special Rights:

Infant
Minor
Legitimacy
Apprentice
Disability
Married Women
Feme Coverte
Coverture
Insanity
Lucid Interval
Capacity

(*b*) *Family Relations*:

Husband and Wife
Settlement
Marriage
Divorce
Alimony
Adultery
Separation
Abandonment
Paraphernalia
Community of Property
Emancipation
Separate Estate

Parent and Child
Adoption
Bastard
Ancestor
Affinity
Consanguinity
Domicile
Guardian

(*c*) Juristic Persons:

Company
Corporation
Ultra Vires
De Facto
Charitable Trusts
Ecclesiastical Corporation
Joint Stock Company
Limited Companies
Limited Liability
Regulated Companies
Stock Company
Dividend
Director
Trust
Trust Fund Doctrine

2. LAW OF PROPERTY:

The term property includes everything that is the subject of possession and ownership, whether tangible or intangible. The various kinds of property are naturally divided into two classifications, REAL and PERSONAL. Real Property includes lands, tenements, and hereditaments, and interests therein. Subjects dealing with the disposition and incumbrance of real property *inter vivos* are also placed under this title. Personal Property includes all movable objects of property, commonly known as chattels, and such claims, obligations, and rights of action as are the subject of transfer. Topics treating of the transfer of property, both real and personal, by will or descent, are classed under the title, SUCCESSION AND INHERITANCE.

(*a*) *Real Property*:

i. Nature of Real Property:

Real Property
Real Estate
Hereditament
Tenement
Mines and Mining
Feudalism
Fee
Fief
Feud
Feu
Accession

ii. Systems of Tenure:

Tenure
Seisin
Manor
Socage
Frankalmoigne
Gavelkind
Ground-Annual
Demesne
Ancient Demesne
Borough English
Burgage Tenure
Tenant Right
Community of Property
Mortmain
Subinfeudation
Sergeanty
Landlord and Tenant
Attornment
Lease
Leasehold
Common, Tenancy in
Tenancy at Sufferance
Tenancy at Will
Rent
Occupancy
Mining Claim

Life Estate
Conditional Fee
Remainder
Reversion
Freehold
Dower
Curtesy
Entry, Right of
Entirety
Equity of Redemption
Equitable Estate
Riparian Rights
Rivers, Navigable and Non-navigable
Inclosures of Commons
Use and Occupation
License
Pew Rights

iii. Transfer and Incumbrance of Real Property:

Alienation
Incumbrance
Bargain and Sale
Conveyance
Conveyancing
Land Transfer, Reform in
Abstract of Title
Search of Title
Deed
Habendum
Restrictive Covenants
Conditional Limitation
Quit Claim
Lease and Release
Demise
Executory Devise
Shifting Use
Entail
Shelley's Case, Rule in
Enrollment
Power of Appointment
Power
Ejectment
Eviction
Adverse Possession
Common Assurance
Elegit, Estate by
Jointure
Escrow
Settled Estate
Tax Sale
Tax Title
Cloud on Title
Perpetuity
Prescription
Quit Rent
Office Found
Partition
Mortgage
Merger
Tacking of Mortgages
Mechanic's Lien
Servitude
Easement
Equitable Easement
Incorporeal
Equitable Mortgage
Building Loans
Donis Conditionalibus
Domesday Book
Recording Acts
Recording of Deeds
Torrens System
Title, Registration of
Title Insurance

(*b*) *Personal Property*:

i. Possession:

Chattel
Movables
Confusion
Treasure-Trove
Chose in Action
Fixtures
Emblements
Estray
Good-Will

Finding
Oysters, Law as to
Wreck

ii. Patents, Patent Law:

Letters Patent
Trademark
Trade-name
Copyright
Literary Property
Invention
Caveat

iii. Contracts, Obligations, and Intangible Property Rights:

Contract
Obligation
Covenant
Consideration
Rescission
Discharge
Breach
Subrogation
Abrogation
Suretyship
Pledge
Reward
Guaranty
Gift
Claim
Debt
Creditor
Commercial Law
Debtor
Payment
Chose in Action
Accord and Satisfaction
Assignment
Donation
Joint Ownership
Sale
Bill of Sale
Auction
Market Overt
Caveat Emptor
Delivery
Condition and Conditional
Vendor's Lien
Lien
Bailment
Carrier, Common
Baggage
Bill of Lading
Forwarding
Consignment
Stoppage in Transitu
Joint Adventure
Freight
Negotiable Instruments
Negotiable Paper
Promissory Note
Check
Bill of Exchange
Bank-Bills
Exchequer Bills
Bought and Sold Notes
Specialty
Bond
Stock
Coupon
Credit, Letter of
Warehouse Receipt
Bottomry Bond
Indorsement
Dishonor
Exchange
Interest
Agent
Factor
Partnership
Mercantile Agent
Mercantile Agency
Master and Servant
Joint Liability
Insurance
Life Insurance
Accident Insurance
Wager Policy

Account
Deposit
Voucher
Receipt
Seal
Notary Public
Acknowledgment
Debenture

(*c*) *Succession and Inheritance:*

Decedent
Estate
Inheritance
Intestacy
Distribution
Succession ab Intestato
Surveyorship
Primogeniture
Inventory
Administration
Will
Testament
Appraisement
Legacy
Residuary Legacy
Ademption
Advancement
Codicil
Share
Beneficiary
Per Stirpes
Devise
Personal Representative
Executor
Undue Influence
Deathbed, Law of
Heir
Heirloom
Accumulations
Lapse
Posthumous Child

B. Remedial Law

I. Public Remedial Law.

This portion of the Adjective, or Remedial, Law deals with crimes, the penalties therefor, and the method of prosecution of accused persons by the State. We shall first take up those topics which define particular crimes, under both statutes and the common law, and then those which deal with the prosecution and punishment of crimes. See:

Adjective Law

1. *Crimes, Misdemeanors, etc.:*

Crime
Criminology
Criminal Law
Misdemeanor
Accessory
Accomplice
Infamy
Felony
Barratry
Blackmail
Blasphemy
Body-Snatching
Bribery
By-Bidding
Burglary
Embezzlement
Robbery
Stolen Goods
Receiving Stolen Goods
Assault and Battery
Security
Security of Person
Manslaughter
Homicide
Murder
Malpractice
Consent

Infanticide
Arson
Smuggling
Counterfeiting
Subornation of Perjury
Compounding of Felony
Suicide
Misprision
Treason
Overt Act
Malicious Mischief
Extortion
Forgery
Sunday
Gambling
Disturbance
Eavesdropping
Embracery
Engrossing
Forestalling
Monopoly
Harboring
Champerty
Concealment
Corrupt Practices
Simony
Piracy
Policy
Fornication
Rape
Incest
Rescue
Riot
Abortion
False Pretenses
Common Scold
Sumptuary Laws
Trading Stamps
Habitual Drunkard

2. Criminal Procedure and Punishment of Crimes:

Criminal Procedure
Arrest
Arraignment
Search
Bench Warrant
Search Warrant
Writ
Attainder
Autrefois Acquit
Benefit of Clergy
Capital Punishment
Charge and Specification
Commitment
Corporal Punishment
Corruption of Blood
Fine
Forfeiture
Hard Labor
Information
Indictment
Justification
Ordeal
Outlawry
Civil Death
Peine Forte et Dure
Penalty
Posse Comitatus
Nolle Prosequi
Prisoner
Prosecution
Prosecutor
Voir Dire
Punishment
Self Defense
Sentence
State's Evidence
Corpus Delicti
Ne Exeat
Torture
Extradition
Locus Delicti

II. Private Remedial Law.

This division of Remedial Law includes the law of Torts and Civil Practice and Procedure. Torts are

wrongs other than those arising out of contract, for which the injured party has a right of action. A tort action is not assignable and is not strictly a property right, and, therefore, the law of torts is properly considered remedial law. Under the title, Civil Practice and Procedure, are grouped all topics dealing with the enforcement of civil rights of action of a private nature.

1. Torts, or Civil Wrongs.

Conversion
Trespass
Assault
Trover
Fraud
Fraudulent Conveyance
Infringement
Slander of Title
Defamation
Slander
Libel
Contribution
Intimidation
Accident
Injury
Misrepresentation
Nonfeasance
Nuisance
Negligence
Malfeasance
False Imprisonment
Malicious Prosecution
Mayhem
Pollution of Watercourses
Criminal Conversation
Employer's Liability
Fellow-Servants

2. Civil Practice and Procedure.

In English jurisprudence, three distinct systems of procedure, corresponding and adapted to distinct systems of jurisprudence, were developed respectively by the courts of common law, the courts of chancery, and the courts of admiralty. The common law procedure is much older than the procedure in either equity or admiralty, as practiced by the English courts, the *curia regis*,—which was the forerunner of the English Courts of Exchequer, Common Pleas, and King's Bench, in which the common law procedure was developed,—having been established in the early part of the twelfth century. Procedure in equity is much simpler than procedure at common law. Its essential characteristics are based on the fact that the sole power of that court is to command things to be done, and not directly to transfer or otherwise affect the rights of litigants. Procedure in admiralty was founded upon the Roman law and corresponds in many particulars to the equity system. The embarrassment experienced as a consequence of the technical character of the common law procedure has led to many reforms by legislation.

Action
Limitation of Actions
Civil Action
Civil Procedure
Forms of Action
Admiralty Law
Equity
Procedure
Practice
Pleading
Process
Code
Code Napoléon
Service of Papers and Process
Next Friend
Parties
Name
Plea

Common Counts
Common Forms
Common Plea
Common Recovery
Debt, Action of
Detinue
Assumpsit
Foreclosure
Replevin
Bill in Equity
Real Action
Civil Death
Claim
Lawyer
Attorney
Advocate
Barrister
Counselor
Solicitor
Disbarment
Client
Plaintiff
Defendant
Respondent
Joinder
Writ
Declaration
Confession and Avoidance
Answer
General Issue
Verification
Demurrer
Disclaimer
Defense
Forma Pauperis, In
Cross-Bill
Confession of Judgment
Case
Chambers
Chancery
Cestui que Trust
Cestui que Use
Master in Chancery
Citation
Month
Attachment
Foreign Attachment
Letters Rogatory
Lis Pendens
Oath
Notary Public
Precept
Discovery, Bill of
Cognovit
Cognizance
Color
Subpœna
Recoupment
Ex Parte
Distringas
Garnishment
Entry, Writ of
Quia Timet
Qui Tam Action
Interrogatories
Affidavit
Bill of Particulars
Certiorari
Habeas Corpus
Motion
Inquiry, Writ of
Inquisition
In Personam
In Rem
Interpretation
Interpleader
Injunction
Prohibition
Special Proceeding
Specific Performance
Trustee Process
Warrant
Quo Warranto
Intervention
Invoice
Bill of Peace
Acknowledgment
Civil Damage Acts

Forcible Entry and Detainer
District Attorney
Hilary Term
Oyer and Terminer
Venue
Judicature Acts
Jurisdiction
Judge
Jury
Challenge
Judge Advocate
Oyer
Stay
Stare Decisis
Damages
Day
Marshalling
Trial
Mistrial
Nonsuit
Incident
Judicial Notice
Evidence
Exception
Circumstantial Evidence
Burden of Proof
Condonation
Admission
Examination
Cross Examination
Witness
Expert
Proof
Handwriting
Testimony
Privilege
Privileged Communication
Laches
Dictum
Precedent
Res Adjudicata
Presumption
Declaration or Affirmation
Alteration
Access
Ambiguity
Argument
Verdict
Special Verdict
Scotch Verdict
Judgment
Award
Appeal
Bill of Costs
Taxation of Costs
Bill of Exceptions
Execution
Supersedeas
Exemption
Sequestration
Distress
Equitable Assets
Receiver
Winding Up of Company

C. International Law

The subjects or persons of International Law are independent sovereign States or nations. The community constituting such State is permanently established for a political end, is possessed of a defined territory, and is independent of external control. If one or more of these elements be lacking, the community is not a State in the sense of International Law. Individuals choose their associates, and States likewise determine whether and when they wish to maintain relations with a newcomer. A fundamental proposition of International Law is the equality of States, of which Chief Justice Mar-

shall said: "No principle of general law is more universally acknowledged than the perfect equality of nations. Russia and Geneva have equal rights. It results from this equality that no one can rightfully impose a rule on another." See:

International Law
Treaty
Diplomacy
Diplomatic Agents
Envoy
Embassy
Ambassador
Neutrality
Enemy
Embargo
Blockade
Contraband
Mare Clausum
High Seas
Territorial Waters
Seashore
Tide Waters
Bering Sea Controversy
Extraterritoriality
Prescription
Privateering
Piracy
Award
Convoy
Extradition
Foreign Judgment
Foreign Law
War; War in Europe; War Zone
Truce
Acts of Hostility
Comity of Nations
Mainprize
Navigation, Freedom of
Navigation Laws
Recapture
Retaliation
Rules of the Road
Salvage
Seamen, Laws Relating to

D. History and Miscellany

1. Agrarian Law:

Anglo-Saxon Law
Customary Law
Common Law
Civil Law
Civil Church Law
Twelve Tables
Salic Law
Scotch Law
Spanish Law
Oléron, Laws of
Law Merchant

2. Parliamentary Law:

Revised Statutes
Medical Jurisprudence
Maxims
Legal Education

3. The following are a few of the names in the ranks of jurists, lawyers, and publicists of all time:

Austin, John
Betts, S. R.
Binney, Horace
Black, J. S.
Blackstone, William
Bluntschli, J. K.
Bodin, J.
Bracton, Henry de
Brougham, Lord
Campbell, John
Choate, Rufus
Coke, Edward

Cooley, T. M.
Curtis, G. T.
Ellsworth, Oliver
Erskine, Lord
Fearne, Chas.
Feuerbach, P. J. A.
Field, D. D.
Field, S. J.
Filangieri, G.
Fortescue, John
Gans, E.
Glanvill
Grotius, Hugo
Hale, Matthew
Holt, John
Janet, Paul
Jeffreys, Lord
Johnson, Reverdy
Kent, James
Laboulaye, E. L.
Lamar, L. Q. C.
Langdell, C. C.
Lieber, Francis
Livingston, Edward
Lowell, A. L.
Maine, Henry
Mansfield, Earl
Marshall, John
Montesquieu, C.
Moore, J. B.
Pardessus, J. M.
Parsons, Theophilus
Plowden, E.
Pollock, F.
Portalis, J. E. M.
Pufendorf, S.
Savigny, F. K.
Smith, Goldwin
Stephen, J. F.
Story, J.
Taney, R. B.
Tocqueville, A. C.
Wharton, F.
Woolsey, T. D.

Chapter 3. Sociology

Sociology

SOCIAL science presents a theoretical and a practical aspect, of which the latter, at the present time, is the more important. Speculation on the origins of social life, the evolution of social institutions, and the nature of existing social bonds has been rich in theories, diverse in view, but casting light on all the course of human development. Society has been variously regarded as an aggregate, an organization, or an organism, and accordingly as it has been regarded its rights and duties as against the individual have been outlined. The influence of the collective body and the collective mind on the body and mind of the individual forms one of the most fascinating topics of sociology, fascinating because of the close connection that may be established between individual and social progress. But as yet scarcely sufficient material has been collected to make social theory strictly scientific, and the greater interest, probably, attaches to what has been called the practical aspect of social science, the study, namely, of contemporary social conditions and the problems which they create. Thus it would not be far from the truth to call practical sociology, social pathology, for as a matter of fact the attention of the working sociologist is directed, in greater part, to the study of the ills of the social body, a study of those individuals and classes of individuals whose presence in the midst of society is a burden or a source of danger to society or the cause of misery to themselves. In this respect social science deals with the helpless and the vicious and is largely coincident with humanitarianism. Theoretical sociology is most closely allied to Anthropology and History, going to the latter for its evolutionary data and to the former for origins. Practical sociology depends very largely on statistics.

I. The methods and theories of sociology are treated at length under that heading, supplemented by minor articles on subsidiary topics. This article, therefore, should be made the starting point on reading. See:

Sociology
Man, Science of
Anthropo-geography
Acclimatization
Environment
Standard of Living
Crowd

A discussion of various social institutions which form part of the data of the sociologist, such as the Family, Marriage, the Tribe, etc., will be found in the chapter on Anthropology and Ethnology.

II. 1. Taking human aggregates as its subject matter, practical sociology draws the greatest uses from statistics. The gathering of statistical data is being initiated wherever governments have as yet failed to assume the office, and where official enumerations prevail their scope is constantly being widened. The study of population is now well advanced. See:

Demography
Census
Population
Vital Statistics
Births, Registration of
Illiteracy
Transportation, Penal
Immigration
Emigration
Migration
Colony
Oriental Immigration
Naturalization
Suicide
Infanticide
Divorce
Marriage
Statistics

2. "Dependents, Defectives, Delinquents," adequately describes the subjects dealt with by the social pathologists. In this immensely broad field, private efforts coöperate with State activity, the former through investigations and advocacy largely, the latter through remedial legislation and the use of State resources. For a study of the dependent and defective classes, see:

Dependents, Defectives, Delinquents
Social Debtor Classes
Debt
Pauperism
Poor Laws
Poor Rate
Casual Poor
Mendicancy
Eugenics
Tramp
Vagrant
Unemployment
Workhouse
Almshouse
Charitable Trusts
Rockefeller Foundation
Rockefeller, J. D.
Rockefeller, J. D., Jr.
Carnegie, A.
Charities
Charities and Correction, National Conference of
Charity Organization Society
Brinkerhoff, Roeliff
Elberfeld System
Blind, Education of the
Keller, H. A.
Perkins, T. H.
Bridgman, L.
Howe, S. G.
Deaf Mute (*Institutions*)
Gallaudet, E. M.
Insane Asylum
Insanity
Idiocy
Mental Defectives
Mental Pathology
Medical Jurisprudence
Bedlam
Degeneracy
Jukes, The

3. Of dependent classes, children, naturally, absorb a large share of the attention of the sociologist and the charity worker. The mission here is not one of relief only, but of redemption, and successful effort in this field discounts future dangers to society. See:

Dependent Children
Foundling Hospital
Penology
Crèche
Marbeau, J. B.
Infant School
Ragged Schools
Rauhes Haus

George Junior Republic
Parks and Playgrounds
Juvenile Court
Juvenile Offenders
Lindsey, B. B.
Children, Societies for
Cruelty to Children, Prevention of
Children's Aid Society
Schools
Wirt, Wm. A.

4. Sufficient reason exists for speaking of a criminal class to make Criminology an independent branch of investigation with something of the methodology of a science. The delinquent, the criminal, is regarded as at war with society. The causes that have changed the course of nature in him and made him anti-social may be heredity or environment or both. The prevention and punishment of crime and the possible reformation of the criminal form the subject matter of the "science." See:

Criminology
Lombroso, Cesare
Bertillon System
Finger Prints
Punishment
Corporal Punishment
Flogging
Penology
Capital Punishment
Prisons
Osborne, T. M.
Convict
Convict Labor
Clinton State Prison
Newgate
Fleet Prison
Millbank Prison
Bicêtre
Conciergerie
Transportation, Penal
Botany Bay
Bagnes
Recidivists
Reformatories
Elmira Reformatory
Juvenile Offenders
Brockway, Z. R.
Ticket of Leave
Mettray
Beccaria, C. B.
Howard, John
Round, W. M.
Fliedner, T.
Fry, Elizabeth
Prison Association, American
Prison Buildings
International Prison Congress

5. The vices of individuals, as well as of classes, affect the welfare of the body politic. (a) The standard of personal purity is rising with the general heightening in moral tone. (b) The evils resulting from the abuse of liquor have led to one of the most notable movements of the nineteenth century. See:

(*a*) Family
Marriage
Divorce
Infanticide
Syphilis
Concubinage
Eugenics
Celibacy
Illegitimacy
Bastard
Prostitution
White Slavery

(*b*) Intoxicating Liquors
Intoxication
Temperance
Prohibition

Prohibition Party (Under Temperance)
License
Liquor Traffic
Excise
Local Option
Gothenburg System
Abstinence Societies
Mathew, T.
Dow, N.
Gough, J. B.
Keeley, L.
Chafin, E. W.
Lend-a-Hand Clubs
Loyal Temperance League
Woman's Christian Temperance Union
World's Woman's Christian Temperance Union
Temperance, Sons of
Good Templars, Independent Order of

6. The problem of remedying social evil has drawn the attention of men in all ages, and thinkers have been fond of busying themselves with the construction of ideal forms of society since the days of Plato. More than philosophers' dreams, however, are the great social movements of modern times, whose aim is the reorganization of society on a different basis than that of the present—private property.

(*a*) For the literary utopias, see:
Plato (The Republic)
Campanella (The City of the Sun)
Defoe, Daniel (An Essay on Projects)
More, Thomas (Utopia)
Harrington, James (Oceana)
Bellamy, Edward (Looking Backward)
Bacon, Francis (New Atlantis)
Fénelon, François (Voyage dans l'Île des Plaisirs)

(*b*) For Communism, see:
Communism
Communistic Societies
Socialism
Shakers
Owen, Robert
Blanc, J. J. L.
Harmonists
New Harmony
Cabet, Etienne
Icarians
Saint-Simon, C. N.
Fourier, F. M. C.
Anarchism
Wells, H. G.
Brook Farm
Hopedale
Oneida Community
Zoar Community
Koreshan Ecclesia
Amana
Noyes, J. H.
Perfectionists
Taborites
Moravians
Anabaptists
Separatists
Ephrota

(*c*) For Socialism, see:
Socialism
Collectivism
Fourierism
Nationalism
Communism
Value
Capital
Industrial Revolution
Debs, E. V.
Berger, V. L.
National Workshops

Saint-Simon, C. H.
Fourier, F. M. C.
Rodbertus, J.
Enfantin, B. P.
Bazard, A.
Considérant, V. P.
Babeuf, F. N.
Proudhon, P. J.
Blanc, J. J. L.
Marx, Karl
Lassalle, F.
Engels, F.
Internationale
Weitling, W.
Liebknecht, K.
Liebknecht, W.
Gronlund, L.
Bellamy, E.
Bebel, F. A.
Vollmar, G. H.
Bernstein, E.
Malon, B.
Godin, J. B. A.
James, E. J.
Millerand, A.
Jaurès, J. L.
Briand, A.
Gronlund, Lawrence
Morris, Wm.
Hyndman, H. M.
Fabian Society
Webb, S.
Kelly, E.
Loria, A.
Wagner, A.
Schmoller, G.
Shaw, G. B.
Nieuwenhuis, D.
Sabotage

(*d*) For Anarchism, see:
Anarchist
Bakunin, M.
Godwin, William
Proudhon, P. J.
Tucker, B. R.
Hess, Moses
Syndicalism
Industrial Workers of the World
Ferrer
Most, Johann
Nihilism
Michel, Louise

(*e*) For quasi-socialistic movements, see:

(*a*) Municipal Ownership
Single Tax
George, Henry

(*b*) Coöperation
Rochdale Pioneers
Consumers' League
Profit Sharing
Leclaire, E. J.

7. Socialism is heterodox in exalting the State over the individual, yet there is rapidly growing recognition of the right of the State to intervene for the protection of the working classes, and to assume functions tending to further their welfare. See:

Factory Inspection
Labor Legislation
Employers' Liability
Employment Bureau
Social Insurance
Labor Church
Labor Colonies
Labor Congresses
Labor Day
Labor Organizations
Labor Party
Labor Problems
Labor Exchange
Child Labor
Sweating System
Lodging Houses
Housing Problem

Tenement House Problem
Bath Houses, Municipal
Postal Savings Banks
Old Age Pensions
Vacant Lot Farming

8. A recent development of social work is the settlement house established in the congested district of great cities to act as a centre of physical and moral uplifting. See:

Social Settlements
People's Palace
Toynbee, Arnold
Hull House
Addams, Jane
Boys' Clubs
Fresh-Air Work
George Junior Republic

See also: Salvation Army; Booth, Charles; Pullman; Krupp Foundries, Social Work at; Y. M. C. A.; Y. W. C. A.

9. For a problem specifically American, see:

Negro in America
Negro Education
Hampton Normal and Agricultural Institute
Tuskegee Normal and Industrial Institute
Washington, Booker T.

Societies in the narrow sense, associations, that is, of individuals, for the attainment of a common aim, have always existed, illustrating in the miniature the gregarious nature of man. Their purpose may be various, social, political, religious, educational, or protective. See for types of each:

Societies
Club
Benefit Societies
Friendly Society
Building and Loan Associations
Secret Associations
Burschenschaft
Carbonari
Mafia
Camorra
Fenian Society
Patriotic Societies
Orders
Templars, Knights
Hospitalers
Brotherhoods, Religious
Jesuits
Societies for Ethical Culture
Fraternities, American College
Academy
Institute of France
Royal Society
Historical Associations, American
Masons, Free
Odd Fellows, Independent Order of
Pythias, Knights of
Elks, Benevolent and Protective Order of
Hibernians, Ancient Order of
Industrial Workers of the World

10. A partial list only of writers and investigators in sociology would include:

Addams, Jane
Althusius, Johannes
Ammon, Otto
Angell, George Thorndike
Appert, B. N. M.
Barth, Paul
Barton, Clara
Baxter, Robert D.
Bebel, F. A.
Birkbeck, George
Bodin, Jean
Booth, Charles
Buckle, Henry T.

Burdett-Coutts, A. G.
Burdett-Coutts, W. L. A.B.
Buxton, Sir Thomas F.
Considérant, V. P.
Cooper, Peter
Coram, Thomas
Crandall, Prudence
Darling, Grace
Durkheim, E.
Enfantin, B. P.
Fairbanks, Arthur
Faithfull, Emily
Folks, Homer
Fourier, François C. M.
Fry, Elizabeth
Galton, Sir Francis
Giddings, F. H.
Girard, Stephen
Godin, Jean B. A.
Gompers, Samuel
Gumplowicz, Ludwig
Gurney, J. J.
Guy, Thomas
Hanway, Jonas
Henderson, C. R.
Hill, Octavia
Hill, Sir Rowland
Hobhouse, L. T.
Holyoake, G. J.
Howard, John
Kidd, Benjamin
Kyrle, John
Lassalle, Ferdinand
Le Bon, G.
Le Play, P. G. F.
Liebknecht, K.
Liebknecht, W.
Livermore, M. A.
Lloyd, Henry D.
Mathew, Theobald
Montefiore, Sir Moses H.
Montyon, A. J. B.
Moon, William
Mott, Lucretia
Neale, Edward V.
Pinkerton, Allen
Rowton, M. W. L.
Sadler, M. T.
Schaffle, A.
Schulze-Delitzch, H.
Seligman, E. R. A.
Sharp, Granville
Smith, Gerrit
Stuckenberg, J.
Tarde, G.
Torrens, W. T. McC.
Toynbee, Arnold
Ward, Lester F.
Waugh, Benjamin
Webb, Sidney
Willard, Frances E.
Wines, F. H.
Worms, René

Chapter 4. Political Economy

Political Economy

Political Economy has been briefly defined as the science of wealth, but this definition requires a further explanation of the peculiar sense in which the term wealth is employed. Wealth has been defined as the body of things that have value, but here again value in the economic sense has a narrower meaning than in ordinary use. Value, in economic discussion, usually means power in exchange, that is, the power of a commodity to command other commodities in exchange. Such attempts at brief definition, however, are not satisfactory, since each primary concept of the science is itself the text for long discussion. The best introduction to the subject will be found in the article, POLITICAL ECONOMY, which outlines clearly the content or scope, the relation of political economy to other branches of study, and the methods of investigation or arrangement that it employs.

I. The fundamental principles should then be studied by reference to the following articles:

Wealth
Production
Labor
Division of Labor
Industrialism
Wages
Money
Bank, Banking
Standard of Living
Capital
Interest
Usury
Rent
Tax
Single Tax
Métayer
Profit
Monopoly
Speculation
Consumption
Value
Coöperation
Distribution
Exchange
Tariff

The history of economic thought should be studied next. In ancient and mediæval times political economy was not marked off from other branches of learning, and no attempt was made to study it systematically. From the historical paragraphs in the article, POLITICAL ECONOMY, it will be seen that to the Greek and Roman philosophers, as well as to the mediæval churchmen, the laws of trade were of interest mainly in their moral bearings. Even in the eighteenth century, when some of its principles were understood, and something like a systematic study was attempted, its scope and importance were not realized. It was regarded as a branch of statecraft. Not private wealth, but the best means of increasing financial power of the state was the main object of investigation. For an account of the various systems of economic thought, and the contributions of individual economists, see the following:

Mercantilism
Physiocrats
Laissez-Faire

Manchester School
Free Trade
New Freedom
Open Door
International Trade
Protection
Balance of Trade
Navigation Laws
Tariff
Quesnay, F.
Smith, Adam
Ricardo, D.
Malthus, T. R.
Thünen, J. H. von
Say, J. B.
Carey, H. C.
Bastiat, F.
Mill, J. S.
Cairnes, J.
Jevons, W. S.
Walker, F. A.
Marshall, Alfred
Boehm von Bawerk, E.
Clark, J. B.
Wagner, Adolf
Schmoller, G.
Menger, K.
Nicholson, J. S.
Patten, S. N.

Obviously the study of past economic conditions is essential to an understanding of the present. On the general subject of Industrial Evolution consult the following:

Manufactures
House Industry
Mir
Guild
Hanseatic League
Merchants Adventurers
Mercantilism
Physiocrats
Industrial Revolution
Factories and the Factory System
Cartwright, E.
Open Field System
Agriculture
Hargreaves, J.
Arkwright, Sir R.
Crompton, Samuel
Watt, James
Whitney, Eli
Spinning
Weaving
Wool
Cotton
Loom
Textile Manufacturing
Eight-Hour Day
(See UNITED STATES, GREAT BRITAIN, GERMANY, etc., for economic evolution of those countries.)

II. Reading the above topics in the order given will have supplied the theoretical and historical basis for the study of actual conditions, practical questions, and proposed measures of reform, which are arranged logically in the following lists:

1. TRADE AND TRANSPORTATION:
Commerce
Barter
Chamber of Commerce
Imports and Exports
Demand and Supply
Exchange
Foreign Money
Ad Valorem
Coasting Trade
Competition
International Trade
Balance of Trade
Stock Exchange
Bond
Stock

Bucket Shop
Customs Duties
Lloyds
Underwriter
Crisis, Economic
Speculation
Transportation
Railways
Express Company
Baggage
Commerce Court
Treaty
Commercial Treaties
Reciprocity
Tariff
Geography, Economic
Mercantile Agency
Port of Entry
Pooling
Labor and Commerce, Department of
Municipal Ownership

See also statistics of Commerce and Railways under the various countries, as UNITED STATES, GREAT BRITAIN, CHILE, etc.

2. LABOR AND CAPITAL:

Trade Unions
Labor
Capital
Labor and Capital, Relations of
Socialism
Communism
Anarchism
Political Economy
Division of Labor
Labor Organizations
Knights of Labor
Labor, American Federation of
Industrial Workers of the World
Wages
Minimum Wage
Labor Union, The American
Railway Brotherhoods
Typographical Union of North America
Letter Carriers, National Association of
Metal Trades Association
Miners, Western Federation of
Mine Workers of America
Labor Representation Committee
Labor Party, British
Manufactures
Strikes and Lockouts
Industrial Arbitration and Conciliation
Sabotage
Syndicalism
Eight-Hour Day
Standard of Living
Union Label
Interlocking Directorates
Boycotting
Lockout
Picketing
Labor Problems
Labor Colonies
Labor Congresses
Contract Labor Law
Labor Day
Labor Legislation
Labor, Department of
Labor Church
Industrial Revolution
Sweating System
Employment Bureau
Labor Exchanges
Labor, Bureaus of
Child Labor
Employers' Liability
Workingmen's Compensation
Accidents, Industrial
Factory Inspection
Social Democracy
Shops
Injunction

3. Governmental Regulation and Encouragement of Commerce and Industry:

Protection
Customs Duties
Tariff
Drawback
Warehousing System
Mercantilism
Industrial Commission
Latin Union
Hamilton, Alexander
List, Friedrich
Balance of Trade
Corn Laws
Anti-Corn-Law League
Cobden Club
Reciprocity
Shipping Subsidies
Coasting Trade
Monopoly
Trusts
Trust Fund Doctrine

4. Money and Credit:

Money
Precious Metals
Foreign Money
Bullion
Coinage
Numismatics
Index Numbers
Tabular Standard
Bimetallism
Latin Union
Monetary Conferences
Monetary Commission
Gresham, Sir Thomas
Gresham's Law
Greenbacks
Currency
Greenback Party
Specie Payments, Suspension and Resumption of
Fiat Money
Credit
Credit, Letter of
Crisis, Economic
Interest
Bank, Banking
Land Banks
Clearing-House
Trust Companies
Bill of Exchange
Exchequer Bills
Crédit Foncier
Mortgage Banks
Rural Credit
Reserve Bank, Federal

5. Taxation and Finance:

Finance
Tax, Taxation
Debt, Public
Independent Treasury
Repudiation
Tariff
Customs Duties
Excise
Internal Revenue System
Budget
Income Tax
Land Tax
Special Assessment
Single Tax

See also sections on *Finance* under the various countries, as United States, Great Britain, Brazil, etc.

6. Insurance and Savings Institutions:

Insurance
Life Insurance
Fraternal Insurance
Fire Insurance
Marine Insurance
Friendly Societies
Workingmen's Insurance

Tontine
Underwriter
Annuity
Savings Banks
Post Office Savings Bank
Trust Companies
Building and Loan Associations

7. Among prominent economists, in addition to those already named in the lists, are the following:

Achenwall, Gottfried
Adams, H. C.
Aguado, A. M.
Anderson, James
Ashley, W. J.
Astor, John Jacob
Atkinson, Edward
Bagehot, Walter
Baring
Baring, A.
Bastable, C. F.
Bastiat, F.
Bates, Joshua
Baudrillart, H. J. L.
Baxter, Robert D.
Beckmann, Johann
Bemis, Edward W.
Biddle, Nicholas
Blanqui, J. A.
Block, Maurice
Bodin, Jean
Boehm von Bawerk, E.
Boisguilbert, P. le P.
Brentano, L. J.
Cairnes, John E.
Carey, Henry C.
Carli, G. R.
Cernuschi, Henri
Chevalier, M.
Child, Sir Josiah
Clark, John B.
Cobden, Richard
Cohn, Gustav
Cooke, Jay
Cossa, Luigi
Courcelle-Seneuil, J. G.
Cournot, A. A.
Decker, Sir Matthew
Dewey, Davis R.
Drexel, Anthony J
Ely, Richard T.
Engel, Ernst
Farr, William
Farrer, T. H.
Faucher, J.
Fawcett, Henry
Ferraris, C. F.
Field, Cyrus F.
Fisher, I.
Fisk, James
Fix, Théodore
Frick, H. C.
Gage, L. J.
Galiani, F.
Garnier, J. C.
Genovesi, A.
Giffen, Sir Robert
Gioja, M.
Giovanitti, A. M.
Girard, Stephen
Glass, Carter
Gould (family)
Gournay, J. C. M. V.
Hadley, A. T.
Hamilton, Robert
Harriman, Edward H.
Haxthausen, A.
Hermann, F. B. W.
Hewitt, A. S.
Hill, James J.
Hobson, J. A.
Horner, F.
Horton, S. D.
Howe, S. G.
Hudson, G.
Hufeland, G.
Ingram, J. K.

Jenks, J. W.
Jevons, W. S.
Kay, Joseph
King, Wm. L. M.
Knox, J. J.
Laing, S.
Laughlin, J. L.
Laveleye, Emile
Law, John
Le Play, P. G. F.
Leroy-Beaulieu
Leslie, T. E. C.
Levasseur, E.
Levi, Leone
List, F.
Loria, A.
McCulloch, J. R.
Mackay, C. W.
Macleod, H. D.
Malthus, T. R.
Marshall, A.
Mayo-Smith, R.
Menger, Karl
Morgan, J. P.
Mun, Thomas
Necker, Jacques
Newmarch, William
Nicholson, J. S.
North, Sir Dudley
Oncken, August
Overstone, S. J. L.
Parien, M. L. P. F. E.
Paterson, Wm.
Peabody, G.
Pender, Sir John
Petty, Sir William
Price, Richard
Quesnay, F.
Raiffeisen, F. W.
Rau, K. H.
Rogers, J. E. T.
Roscher, W. G. F.
Rothschild
Say, J. B.
Say, L.
Schäffle, A. E. F.
Schmoller, G.
Schulze-Delitzsch, F. H.
Seebohm, F.
Seligman, E. R. A.
Senior, N. W.
Soetbeer, A.
Sumner, W. G.
Taussig, F. W.
Tooke, Thomas
Torrens, Robert
Tucker, Josiah
Vanderbilt (family)
Wagner, Adolf
Wagner, H.
Walker, F. A.
Walker, R. J.
Walrus, M. E. L
Watkin, Sir E. W.
Wells, D. A.
Wolowski, L. F. M. R.

8. For Economic and Social Reform Movements, see section 6 of the preceding division (Sociology).

Chapter 5. Anthropology

TAKEN in its broadest signification, Anthropology, the science of Man, would include within its scope all the sciences and arts as dealing with particular phases only of the history of human life on earth. Physiology, Psychology, Philosophy, Linguistics and Literature would then be proper fields of study for the anthropologist, as to a large extent they are. But the field of human knowledge is so broad, and the scope of every particular science in fact so extensive, that in the nature of things no single mind can at the present day carry on the work of scientific investigation in more than a limited field of inquiry. Practically, therefore, anthropology, with its allied science of ethnology, has become the study of a man as a zoölogical genus, and secondly, the study of the origins of culture as deduced from ancient remains and the testimony afforded by surviving savage races whose life has as yet undergone no such differentiation as to put it beyond the study of a single mind. Among them are sought the germs of present institutions and beliefs, which are followed up until they become the things of which history takes cognizance. Primitive life, then, is largely the subject of anthropology which deals also with survivals of primitive modes of life and methods of thought in our own times. Thus the topic of Folklore and Customs falls fairly within its field. See:

Man, Science of
Anthropology
Ethnography

1. The study of human anatomy and physiology is of primary importance in the science of man. On the basis of morphological and physiological peculiarities, various classifications of mankind have been made, and our knowledge of prehistoric man is largely a matter of skulls and thigh bones. The measurement of the human body has become a science in itself. See:

Somatology
Craniometry
Skin
Mongolian Spots
Anthropometry
Melanism and Albinism
Hair
Giants
Dwarf
Skull

2. Remains of prehistoric man have been found in both hemispheres, but most plentifully in Europe. Ingenious comparative studies allow us to arrive at a fair conception of the physical characteristics of the earliest inhabitants of the world. See:

Barrow
Mound-Builders
Megalithic Monuments
Dolmen
Avebury
Stonehenge
Spy
Chelléan
Cro-Magnon
Furfooz Race
Hallstatt Epoch
Madeleine, La

Mousterian Epoch
Neanderthal Man
Lansing Man
Kitchen-Midden

3. For the great divisions of mankind determined on the basis of physical characteristics and geographical distribution, see:

Caucasian Race
Europe, Peoples of
Mediterranean Race
Mongolian Race
Negro
Indian Peoples
Malayan Peoples
Melanesians
Indians, American
Mixed Races

4. On the question of the origin of mankind there has been much disputation among anthropologists with little positive results. See:

Evolution
Pithecanthropus

5. Man has nowhere been found in complete isolation. From the first he appears as the social being with his life conditioned by the co-existence of others of his kind. Co-existence meant likeness of thought and experience and the necessity of intercommunication. Our interest, therefore, turns to language. See:

Language
Philology
Gesture Language
Sign Language
Writing
Hieroglyphics
Cuneiform Inscriptions
Wampum

6. In common with the animals man is early engaged in a struggle for the material needs of existence, with greater needs to satisfy, however, than the animals, and consequently with growing resources.

(*a*) The desire for food is the primal motive in life. See:

Cannibalism
Geophagy
Cookery
Pottery

(*b*) According to the nature of the physical conditions amidst which he dwelt, man found shelter for himself. See:

Tent
Wigwam
Cave-Dwellers
Cliff-Dweller
Mesa
Earth Lodge
Lake Dwellings
Archæology, American
Casa Grande
Oaxaca, Ruins of
Palenque
Nomad
Gypsies

(*c*) Dress, it is well established, came from no need of protecting the body, but had its origin in ornament. See:

Dress
Tattooing
Headdress
Hairdressing

7. Man entered upon a rapid course of development when, in his search for sustenance and shelter, he began the use of tools. See:

(*a*) For Implements:
Flint Implements

Celt
Stone Age
Bronze, Age of
Archæology, American
Paleolithic Period

(*b*) For Weapons:

Arrow
Blowgun
Tomahawk
Boomerang
Scalping

For the beginnings of the agricultural stage, see:

Agriculture
Plow
Domestic Animals

8. The religion of primitive man is essentially the belief in a universally animated world, a world of spirits, to combat and placate whom is the business of his life. See:

Animism
Totemism
Superstition
Religion, Comparative
Magic
Necromancy
Oracle
Nature-Worship
Fire-Worship
Phallicism
Fetishism
Shamanism
Amulet
Manitou
Demonology
Demoniac
Satanism
Voodoo
Ghosts
Fast
Sacrifice

9. Birth and death are naturally portentous phenomena to the primitive mind, and are marked, death especially, by various ceremonies. In case of death the rites connect themselves with the belief in existence beyond the grave. See:

Couvade
Circumcision
Teknonymy
Infanticide
Mortuary Customs
Burial
Cist-burial
Suttee
Coffin

10. The origin of the family relation is a subject of much controversy; and the older view that, preceding the present organization of the family under the authority of the father and conditioned by the element of property, mankind passed through a stage in which the family centered around the mother, in whom authority was vested, and from whom descent was traced has been abandoned. See:

Marriage
Matriarchate
Partriarchate
Polygamy
Polyandry
Levirate Marriage
Clan
Tribe
Totemism
Caste
Exogamy
Miscegenation
Slavery

11. Primitive morality is often regarded as ultilitarian and narrow in the scope of its application; but a

great deal of data has accumulated to negate this interpretation. In primitive life the social group is independent politically and, hence, frequently hostile with its neighbors, but this is not essentially different from civilized governments. Internally each of these primitive groups is governed by a legal code. Primitive law is summed up in custom. See:

Law
Custom
Taboo

12. Energy not directed towards the direct satisfaction of material wants finds expression among savages in games and sports. Æsthetics, modern research goes to show, had its origin in play. See:

Art, Primitive
Æsthetics
Swastika
Festivals
Dancing
Corroboree
Sun Dance
Snake Dance
Music
Areois
Potlatch

13. The survival of primitive thought in custom, legend, superstition, and common practices shows how continuous is the line of development from the mental life of primitive man to our own. For the entire subject of folk lore, see:

Folklore
Nursery Lore
Nursery Rhymes
Superstition
Magic
Witchcraft
Incantation
Vampire
Werwolf
Griffin
Dragon
Unicorn
Mermaid
Fairy
Morgan, the Fay
Avalon
Goblins
Oberon
Puck
Robin Goodfellow
Baring-Gould, S.

14. The data of anthropology have been collected from many sources, and the outline of the principles of the science may be filled in with concrete detail, by referring to the many descriptive articles on the primitive peoples. Of the most interesting primitive groups for the anthropologists, a partial list would be the following:

(*a*) For America, see INDIANS, AMERICAN, an elaborate study which may be carried into great detail by following out the cross references to every tribe of North, Central, and South America. See also ESKIMO.

(*b*) For Asia:

Philippine Islands
Aino
Andamanese (under Andamans)
Sundanese (under Sunda Islands)
Dyak
Gonds
Gurkhas
Khonds

Karens
Mois
Miao-Tse
Shans
Thai
Todas
Veddas
Baluchis (under Baluchistan)
Bhil
Bedouin
Kurds
Buriats
Giliaks
Kalmucks
Golds
Kirghiz
Koriaks
Ossetes
Tchuktchi
Tchuvashes
Tatars
Ugrians
Uzbeks
Vedahs
Yakuts
Yukagirs
Malayan Peoples
Polynesians
Melanesians
Micronesians
Negritos

(*c*) For Africa:

Akka
Bantu
Bejas
Berber
Kabyles
Bushmen
Hottentots
Kafirs
Dinka
Fellah
Masai
Hausa (under Hausa States)
Niam Niam
Somali
Yolof
Yoruba
Zulus (under Zululand)

(*d*) For Australasia:

Australians (under Australia)
Maoris
Tasmanians (under Tasmania)

(*e*) For Europe:

Europe, Peoples of
Basque Race
Gypsies
Lapps (under Lapland)

15. A partial list of well-known anthropologists would include the following names:

Andre, R.
Bandelier, A. F. A.
Bastian, A.
Beauchamp, W. M.
Berendt, K. H.
Boas, F.
Brinton, D. G.
Broca, P.
Catlin, G.
Cushing, F. H.
Faidherbe, L. L. C.
Flower, W. H.
Fritsch, G. T.
Furness, W. H.
Gatschet, A. S.
Haddon, A. C.
Hale, H.
Hartmann, R.
Hodge, F. W.
Holmes, W. H.
Kanitz, F. P.
Kroeber, A. L.
Laufer, B.

Lubbuck, J.
McCurdy, J. F.
McGee, W. J.
McLennan, J. F.
Mallery, G.
Mantegazza, P.
Mason, O. T.
Mooney, J.
Morgan, Jacques de
Morgan, L. H.
Mortillet, L. L.
Pilling, J. C.
Powell, J. W.
Prichard, J. C.
Putnam, F. W.
Quartrefages, J. L. A.
Ranke, J.
Ratzel, F.
Reinach, S.
Ripley, W. Z.
Rivers, W. H. R.
Schoolcraft, H. R.
Sergi, G.
Smith, Buckingham
Squier, E. G.
Topinard, P.
Tylor, E. B.
Ujfalvy, C. E.

Chapter 6. Religion

OF THE numerous classifications of religion, none of which is free from many serious objections, we may adopt as the most practical that which divides creeds into monotheistic and non-monotheistic; and though here, too, we are confronted by the difficulty that certain faiths are neither one nor the other, completely, we may apply the former term to the three great religions of Judaism, Christianity, and Mohammedanism, and classify under the second heading all beliefs whatsoever, from primitive animism through the various national mythologies to the great moral and philosophic systems of the East. The starting point should be the comprehensive article on RELIGION, COMPARATIVE. The subject may be then pursued through such general articles as BELIEF, WORSHIP, RITE, PRAYER, SACRIFICE, PRIEST, etc. Additional titles, in great number, will naturally suggest themselves to the reader. The field, indeed, is extensive and touches intimately on the domains of Anthropology, Psychology, Philosophy, and History. This will be found especially true in the religions of the East, where philosophy and mythology or religion are practically one.

A. Polytheistic Religions

1. The beginnings of religion, as studied in the beliefs of primitive races, will be found treated in the chapter on Anthropology, where appear such titles as

Man, Science of
Nature-Worship
Fetishism, etc.

The subject is carried on in the special articles dealing with individual tribes and nations, of which a list appears in the same chapter.

2. The religions and mythologies of Babylonia, Assyria, Egypt, Greece, and Rome are discussed in the chapter on History, in the various sections devoted to those countries. The intimate connection of the religions and the political life in the ancient world has made this division seem desirable.

3. The mythology of the Scandinavian and Teutonic races differs from that of Greece in its pervading atmosphere of gloom and the foreboding of fate. The northern divinities lack the joyous grace and humanity of the Olympian pantheon, and the powers of darkness, cold, and death play a far more conspicuous part. See:

Mythology
Polytheism
Scandinavian and Teutonic Mythology
Edda
Aesir
Asgard
Bifröst
Yggdrasil
Mimir
Norns
Odin
Tyr
Thor
Bragi

Balder
Loki
Freyja and Frigga
Ragnarök
Fenrir
Walhalla
Hel
Niflheim

4. We leave pure polytheism in passing to the great religions of India. It, there, evolves with time into complex systems of mythology modified by pantheism and agnosticism.

(*a*) Brahmanism.

Brahmanism may go back to the second millennium before the Christian era, and comprises the mass of beliefs and institutions originated or elaborated from a primitive nature-worship, by the Brahmans, who constitute the dominant class among the Hindus. It is essentially a legislative system, with a vast and minutely outlined ceremonial. In its later development, it is characterized by pantheism, the doctrine of Karma, and metempsychosis. See:

Brahmanism
Aryan
Veda
Brahmana
Upanishad
Manu
Brahma
Varuna
Agni
Indra
Ushas
Maruts
Pitris
Sankhya
Nyaya
Vēdānta
Mahabharata
Rāmāyana
Vishnu
Śiva
Krishna
Purāna
Tantra
Vaishnavas
Śaivas
Śâktas
Pārvatī
Kali
Lakshmī
Hanumān
Ganesa
Śraddha
Caste
Henotheism
Karma
Metempsychosis
Theosophy
Sikhs

(*b*) Buddhism.

Buddhism antedates Christianity in its origin, and its adherents are second in number only to those of the Christian faith. Taking its rise in Hindustan, it has spread over China, Indo-China, Japan, Tibet, and the plains of Northern and Central Asia. In that continent, its mission as a bearer of civilization and morality has been not unlike the rôle played by Christianity in Europe and America. See:

Buddhism
Pitaka
Asoka
Metempsychosis
Karma
Nirvana
Śravaka
Shin-Shu
Bonze

For a Variant of Buddhism, see
Lamaism
And, for an Allied Creed, see
Jainism
See also Brahmanism, above.

5. Zoroastrianism.

In the great religion of Iran, we may find the earliest traces of primitive Aryan belief. Zoroastrianism is important for the influence it exercised on Judaism and Christianity, to which it contributed the great dualistic principle of the conflict between good and evil. See:

Zoroastrianism
Zoroaster
Avesta
Gâthâs
Pahlavi Language and Literature
Magi
Parsis
Ghebers
Ormazd
Ahriman
Mithras
Asmodeus
Saoshyant

6. The prevailing religion in China and Japan is Buddhism. The native religious systems of China are in reality moral philosophies. In Japan, however, we find a peculiarly national religion, influenced to some extent by Chinese and Buddhistic elements. See:

(*a*) Confucius
Mencius
Chu-Hi
(*b*) Taoism
Lao-tse
(*c*) Shintō
Kōbō Daishi
Fox-deity
Bushido

B. Monotheistic Religions

I. Judaism.

The history of the Jewish people, who claimed to be the nation specially favored of the One God, and the sole depository of His revelation, will be largely found in the historical chapter of this book; but here a few further indications may be given of some of their peculiar institutions. Their worship, in its earlier form, is described under Tabernacle, then under Temple, and in a special section of the article Sacrifice, and a still later development is treated under Synagogue.

Special observances at particular seasons are treated under:

Passover
Purim
Atonement, Day of
Pentecost
Dedication Feast
Weeks, Feast of
Tabernacles, Feast of
Sabbath
Jubilee, Year of

On their sacred writings, besides the articles on each book of the Old Testament, see:

Talmud
Targum
Midrash
Gemara
Mishna

The functionaries of their religion and justice come under:

Priest
High Priest
Levite
Scribe
Rabbi
Sanhedrin

Other characteristic customs and usages:

Circumcision
Tithes
Unction
Proselyte
Urim and Thummim
Phylactery

The sects and parties which developed in course of time among the race are detailed under JEWISH SECTS, and specially in the following articles:

Pharisees
Sadducees
Essenes
Chasidim
Frank, Jacob

II. CHRISTIANITY.

1. FOUNDATIONS. The history of Christianity is so diversified, and so intimately bound up with the development of European civilization, that a large amount of space is necessarily accorded to it. The most convenient division will begin with the foundations, including under that head the articles centring around its Founder and the history and worthies of the first few centuries of the Christian era, before Europe was submerged in the chaos which resulted from the barbarian invasions. See:

Christianity
Creeds and Confessions
Fundamentals of Christian Doctrine
Development of Doctrine
God
Jesus Christ
Incarnation
Hypostatic Union
Atonement
Intercession, Doctrine of
Resurrection
Miracles
Holy Ghost
Filioque
Trinity, Doctrine of the
Nicene Creed
Prayer
Providence
Predestination
Foreknowledge and Foreordination
Sin
Original Sin

Besides the article under the title ESCHATOLOGY, several others which follow deal with the problems which have so exercised the mind of man as to his ultimate destination after the short period of life in this world. See:

Immortality
Judgment, Final
Millennium
Second Advent of Christ
Apocalyptic Literature
Antichrist
Annihilationism
Heaven
Beatific Vision
Hell
Probation after Death
Purgatory
Limbus

The following articles deal with the organizations by whose means the religion of Christ was spread throughout the world, and with early records of its faith and practice:

Church

Council
Synod
Missions, Christian
Apostle
Doctors of the Church
Fathers of the Church
Persecutions of the Christians
Lapsed
Catechumens
Disciplina Arcani
Agapæ
Teaching of the Twelve Apostles
Apostolic Constitutions
Apostolic Fathers
Jerusalem, Councils of
Nicæa, Councils of
Constantinople, Councils of
Ephesus, Councils of
Council of Chalcedon (under Chalcedon)

For the great figures of the period of foundation and dissemination, see:

Mary
Joseph
John the Baptist
Peter
Paul
John
James
Philip
Bartholomew
Thomas
Andrew
Jude
Barnabas
Matthias
Mark
Luke
Mary Magdalene
Timothy
Titus
Stephen
Justin Martyr
Ignatius
Irenæus
Polycarp
Agnes
Agatha
Alban
Apollos
Athanasius
Arius
Augustine
Barbara
Basil
Boniface
Cassianus, Johannes
Cecilia
Chrysostom
Cyprianus
Cyril of Alexandria
Cyril of Jerusalem
Denis
Dionysius
Ephraem
Epiphanius
Eusebius
Felicitas
Fortunatus, Venantius
Gregory of Nazianzus
Gregory of Nyssa
Gregory Thaumaturgus
Gregory of Tours
Hilary
Hippolytus
Hosius
Isidore of Seville
Jerome
Lawrence
Martin of Tours
Patrick
Prudentius, Aurelius Clemens
Theodore of Mopsuestia

2. Early Sects and Heresies. No sooner had the Christian Church been fully organized and entered upon its mission of converting, than the infinite diversity of human minds im-

pelled different men to emphasize disproportionately some one aspect of the faith which all at first held in common. This was especially the case during the first three centuries, while Christianity had its chief stronghold in the East, the speculative and dialectical minds of whose people were naturally inclined to minute questions of abstract theology. The heresies which took their rise in the West were of a more practical kind, dealing, like Montanism, with the severity of discipline, or, like Pelagianism, with the freedom of the human will. Those who wish to trace the abstruse questions which threatened to divide the Church even before it had emerged from the shadow of persecution, may consult especially the following articles:

Adiaphorists
Adoptian Controversy
Arius
Aëtius
Agnoetæ
Alogians
Apollinaris
Celsus
Cerdonians
Cerinthus
Docetæ
Donatists
Dositheans
Ebionites
Elkesaites
Eutyches
Gnosticism
Hesychasts
Iconoclasm
Macedonians
Manichæism
Monarchians
Monophysites
Monothelitism
Montanus
Nestorians
Nicolaitans
Novatian
Origen
Patripassianism
Paulicians
Pelagianism
Sabellius
Semi-pelagianism
Valentinians
Vigilius

3. Traditional Christianity. The latter history of Christianity may be most conveniently divided into two main heads—according as the various Christian bodies have adhered, to a greater or less extent, to the older usages or beliefs, or have broken away from them, and evolved new ones of their own. Of these two divisions, the former is inevitably much the larger, covering a much greater extent of time and a wider range of subjects. The naturally unchanging East has been less affected by the currents of thought, and the many practical problems, which have introduced many changes or developments in the western world. The articles Papacy, which traces the history of the central see of Christendom, down to the Council of Trent; Roman Catholic Church, which includes the subsequent history of the churches in communion with it; and Gallican Church, give a large part of the general institutional development; and the biographies of nearly all the Popes, contain valuable indications of the policy which has at different periods guided the larger part of Christendom. The article, Church History, contains an account of the principal

writers who have narrated this development; and the following articles contain detailed information on all the more important points.

(*a*) For Church Organization, see:

Patriarch
Metropolitan
Archbishop
Bishop
Titular Bishops
Suffragan
Apostolic Succession
Orders, Holy
Cardinal
Conclave
Legate
Priest
Rector
Vicar
Vicar-General
Archdeacon
Cathedral
Dean
Chapter
Rural Dean
Deacon
Subdeacon
Acolytes
Reader
Exorcist
Ostiarius
Tonsure
Council
Encyclical Letters
Bull
In Cœna Domini
Unigenitus
Brief, Papal
Church Discipline
Excommunication
Dispensation
Indulgence
Inquisition
Congregation
Propaganda
Index
Commandments of the Church
Celibacy

(*b*) Christianity had scarcely been organized before a definite form of worship was adopted, and this became more and more fixed and uniform in its details as time went on. A great many matters of interest are contained in the history of these liturgical forms, which will be found fully given under numerous titles. See:

Worship
Liturgy
Mozarabic Liturgy
Mass
Requiem
Introit
Kyrie Eleison
Gloria in Excelsis
Collect
Epistle
Gradual
Sequence
Gospel
Offertory
Secret
Missal
Pontifical
Ritual
Processional
Canonical Hours
Breviary
Lesson
Te Deum
Magnificat
Nunc Dimittis
Miserere
De Profundis
Ave Maria
Angelus Domini

Hymnology
Dies Iræ
Pange Lingua
Tantum Ergo
Veni Creator Spiritus
Litany
Benediction
Rosary of the Blessed Virgin Mary
Tenebræ

(*c*) Under COSTUME, ECCLESIASTICAL, a full account will be found of the historical development of ecclesiastical vestments and their use at the present day in various parts of Christendom. A number of other articles also give details as to specific vestments and articles used in divine worship. See:

Tiara
Pallium
Mitre
Crosier
Stole
Maniple
Surplice
Flabellum
Altar
Tabernacle
Incense
Censer
Cross
Chalice
Corporal
Agnus Dei

(*d*) The Christian religion, at least in its ancient and traditional form, is essentially a sacramental one. In other words, it provides for the two-fold nature of man—body and soul—by using outward and visible signs to convey inward and spiritual grace. A large number of important subjects, accordingly, fall under the heading Sacrament. See:

Sacrament
Baptism
Clinic Baptism
Heretic Baptism
Sponsors
Confirmation
Lord's Supper
Transubstantiation
Viaticum
Penance
Confession
Absolution
Orders, Holy
Marriage
Extreme Unction
Sacramentals
Holy Water
Scapular
Jubilee
Pilgrim
Stations
Image-Worship
Foot-Washing

(*e*) Very early in the history of the Christian Church, special observances began to be connected with certain days—weekly, and annual commemorations of events in the life of its Founder, and anniversaries of the chief worthies who adorned its history. These are treated under:

Sunday
Friday
Festivals
Fast
Christmas
Epiphany
Candlemas
Annunciation
Ash-Wednesday
Lent
Holy Week
Maundy Thursday

Good Friday
Easter
Ascension Day
Pentecost
Trinity Sunday
Corpus Christi
Assumption of the Virgin Mary
All-Soul's Day
Ember-Days
Angel
Michael
Gabriel
Saint
Martyr
Canonization
Beatification
Advocatus Diaboli
Acta Sanctorum

(*f*) It is scarcely necessary to enumerate the separate books of the Bible, on which every organization of Christians professes to base its creed. Under each of their titles, the history and purport of every book may be studied, as well as the most approved conclusions of the most recent scientific criticism. Questions relating to the Bible as a whole are discussed at great length in the main article BIBLE; and reference may be made to the following subsidiary titles:

Inspiration
Revelation
Canon
Biblical Criticism
Bible Archæology
Textual Criticism
Tübingen School
Concordance
Apocrypha
Deuterocanonical Books
Bible Society
Bible, Curious Editions of

4. THE MONASTIC LIFE. As the civilized world, under the later Roman empire, grew more and more corrupt, the feeling gained ground that the surest way to escape from the wrath to come was to flee into the desert, and by prayer and mortification to avert the divine displeasure. The monastic life, therefore, considered as the most perfect carrying out of the counsels of Christ, took firm root in the Church. General details of its spirit and organization will be found under:

Monasticism
Asceticism
Vow
Monastery
Laura
Hermit
Recluse
Pillar Saint
Abbey
Abbot
Canon
Brothers, Lay
Brotherhoods, Religious
Tertiary
Monastic Art

The earlier monastic ideal was that of absolute separation from the world, considered as an inherently wicked place; and all the older orders, though frequently of the greatest service to society and civilization by their preservation of learning, and by their diligent labors in agriculture and the like, approach more or less the type known as cloistered orders. Of these the principal ones follow in chronological sequence, with their founders, where these have separate articles:

Antony

Paul
Basilian Monks
Augustinians
Benedictines
Benedict
Cluniacs
Camaldolites
Carthusians
Bruno
Chartreuse, La Grande
Charterhouse
Cistercians
Bernard
Premonstratensians
Gilbertines
Beguines
Carmelites
Servites
Celestines
Brigittines
Bridget
Ursulines
Angela Merici
Trappists
Rancé, Armand de

As modern society gradually became organized on more stable foundations, and men whose temperaments and habits were peaceful could be safe under its protection, another type came forward, whose fundamental idea was not retirement from the world, but an effort to sanctify it, by mingling more or less with it. Under the head of what may be called missionary communities, the following are to be noted:

Sisterhoods
Trinitarians
Franciscans
Francis of Assisi
Clares, Poor
Clare
Dominicans
Dominic
Minimites
Francis of Paola
Barnabites
Theatines
Capuchins
Jesuits
Ignatius of Loyola
Oratory, Congregation of the
Philip Neri
Oblates
Borromeo, Carlo
Piarists
Visitation, Sisters of the
Francis de Sales
Chantal, Jeanne Françoise
Lazarists
Vincent de Paul
Sulpicians
Olier, Jean Jacques
Brothers and Sisters of Charity
Brothers of the Christian Schools
La Salle, Jean Baptiste de
Passionists
Paul of the Cross
Redemptorists
Liguori, Alfonse Maria di
Sacred Heart, Ladies of the
Mercy, Fathers of
Paulists

5. Mediæval Period. The religious aspect of the Middle Ages will be found represented in nearly every article in the foregoing section; but certain others may be added which give an account of significant developments taking place within this period. Thus we have the formal organization of a whole logical system of dogmatic theology and philosophy (see Scholasticism), and of a parallel system of ethics or moral theology (see Casuistry). The story of the Crusades is of great importance, supplemented

under JERUSALEM by the history of the kingdom and patriarchate there established. The crucial controversies between Church and State which persisted throughout the Middle Ages are treated under INVESTITURE and REGALIA as well as under PAPACY. (See also in the chapter on history the section dealing with the Mediæval Ages.) Under SCHISM, WESTERN, we may follow the division within the Church caused by the pretensions of rival popes. The efforts made to secure unity of faith and discipline appear under:

Lateran Councils
Basel, Council of
Ferrara-Florence, Council of
Pisa, Council of
Lyons, Councils of
Inquisition
Torquemada

The story of those who in this period broke away from that unity is told under:

Cathari
Fraticellians
Albigenses
Waldenses
Brothers and Sisters of the Free Spirit
Apostolic Brethren
Lollard
Abélard
Berengarius of Tours
Gottschalk
Wiclif

Other topics of special mediæval interest are:

Joan, Pope
Feast of Fools
Biblia Pauperum
Pseudo-Isidorian Decretals
Fulda, Monastery of
Saint Gall
Monte Cassino

The great names in the theology, philosophy, and mysticism of the Mediæval Ages include:

Adalbert
Ailly, Pierre d'
Albert, Count of Bollstädt
Alexander of Hales
Anselm
Aquinas, Thomas
Becket, Thomas à
Bede
Bonaventura
Catharine of Siena (under Catharine)
Clémanges, Nicolas de
Columba
Damiani, Pietro
Duns Scotus
Dunstan
Eadmer
Erigena, Johannes Scotus
Joachim of Floris
Kempis, Thomas à
Lanfranc
Lully, Raymond
Malachy
Occam, William of
Peter Lombard
Peter the Hermit
Rabanus Maurus
Savonarola, Girolamo
Tauler, Johann
Teresa, St.
Wadding, Luke
William of Saint-Amour
William of Wykeham

6. THE REFORMATION PERIOD. A special section may well be devoted to the period of unrest and disruption commonly known as the Reformation.

All over Europe there was a movement, more or less general and permanent according to local circumstances, towards throwing off the authority of the Pope, simplifying faith and worship, and returning to what were assumed to be primitive beliefs and usages. See:

Reformation
Counter-Reformation
Utraquists
Communion in Both Kinds
Brethren, Bohemian
Augsburg Confession
Interim
Concord, Book of
Corpus Doctrinæ
Magdeburg Centuries
Epistolæ Obscurorum Virorum
Antinomianism
Bartholomew's, Massacre of Saint
Dort, Synod of
Reformed Churches
Trent, Council of

For the Men of this Period, see:

Albert (of Magdeburg)
Baronius, Cæsar
Bellarmine
Beza, Théodore
Bucer, Martin
Bugenhagen, Johann
Cajetan, Thomas
Campion, Edmund
Calvin, John
Canisius, Petrus
Cano, Melchior
Carlstadt
Colet, John
Eck, Johann Maier von
Erasmus, Desiderius
Erastus, Thomas
Faber, Jacques
Fisher, John
Hamilton, Patrick
Hooper, John
Hutten, Ulrich von
Luther, Martin
Melanchthon, Philip
More, Thomas
Œcolampadius, Johannes
Philip the Magnanimous
Reuchlin, Johann
Sarpi, Paolo
Tetzel, Johann
Vermigli, Pietro Martire
Wishart, George
Zwingli, Ulrich

7. Before proceeding to a review of the Reformed Churches of modern times, the history of Eastern Christianity, separate from that of the Roman Catholic Church since 1054, may be studied under the following titles:

Greek Church
Filioque
Quinisext
Photius
Lucaris
Nikon
Raskolniki
Dukhobortsy
Molokani
Skoptsy
Stundists

8. Modern Reformed Churches.

(*a*) Anglican. The article under the title, Anglican Communion, explains the extent and relations of the various churches in communion with the Church of England, which represent characteristically the more conservative elements in the religion of the English-speaking races. Though as organizations they owe their origin to the great upheaval of the sixteenth century, their doctrine and usages are

largely in harmony with those which prevailed before the Reformation, and will be found treated in many instances under titles which include the ancient and modern Roman Catholic belief or practice. The following articles, however, may be consulted for specifically Anglican points:

England, Church of
Ireland, Church of
Episcopal Church
Articles, The Thirty-nine
Prayer-Book
Homily
Lambeth Conference
Church Congress
Supremacy, Royal
Ecclesiastical Commissioners
Vestry
Warden, Church
Parish
Parish Clerk
Lay Reader
Advertisements of Elizabeth
Martin Marprelate Controversy
Savoy Conference
Nonjurors
Nonconformists
Dissenters
Act of Uniformity
Oxford Movement
Gorham Controversy
Ecclesiastical Titles Assumption Act
Ritualism
Queen Anne's Bounty
Christian Knowledge, Society for Promoting
Church Temperance Society
Brotherhood of Saint Andrew
Daughters of the King
Bampton Lectures
Hulsean Lectures

Among the prominent names in the history of the Church of England in Great Britain appear:

Cranmer, Thomas
Ridley, Nicholas
Latimer, Hugh
Hooker, Richard
Laud, William
Andrewes, Lancelot
Hall, Joseph
Ken, Thomas
Leighton, Robert
Taylor, Jeremy
Sanderson, R.
Whitgift, J.
Tillotson, John
Wake, William
Atterbury, Francis
Warburton, William
Simeon, Charles
Romaine, W.
Pusey, Edward Bouverie
Keble, John
Rose, Hugh James
Forbes, Alexander P.
Liddon, Henry Parry
Maurice, Frederick Denison
Arnold, Thomas
Robertson, Frederick W.
Milman, Henry Hart
Jowett, Benjamin
Stanley, Arthur Penrhyn
Wilberforce, Samuel
Trench, Richard Chenevix
Vaughan, Charles J.
Wordsworth, Charles
Wordsworth, Christopher
Benson, Edward White
Lightfoot, Joseph Barber
Westcott, Brooke Foss
Thorold, Anthony Wilson
Stubbs, William
Bright, William

Tait, Archibald Campbell
Temple, Frederick

Of the Church in America the leading representatives have been:

Seabury, Samuel
White, William
Hobart, John Henry
Provoost, Samuel
Hopkins, John Henry
Muhlenberg, William Augustus
Tyng, Stephen H.
Whittingham, William Rollinson
Williams, John
Whipple, Henry B.
Potter, Horatio
Potter, Alonzo
Potter, Henry Codman
Brooks, Phillips
Newton, Richard Heber
Dix, Morgan

(*b*) PRESBYTERIAN:

Presbyterianism
Elder
Moderator
Synod
Westminster Assembly
Perth, Five Articles of
Cameronians
Covenants, The
Infralapsarian
Alexander, Archibald
Alexander, J. A.
Babcock, M. D.
Baird, C. W.
Briggs, C. A.
Burrell, D. J.
Calamy, Edmund
Cameron, J.
Chalmers, Thomas
Cuyler, T. L.
Geddes, J.
Green, W. H.
Hall, John
Hodge, C.
Knox, John
Melville, Andrew
Parkhurst, C. H.
Patton, F. L.
Paxton, J. R.
Prentiss, G. L.
Prime, S. I.
Robinson, C. S.
Shields, C. W.
Talmage, T. DeWitt
Tennent, Gilbert
Watson, John
Witherspoon, J.

(*c*) METHODIST:

Methodism
Itinerancy
Experience Meeting
Camp-Meeting
Epworth League
Wesley, John
Wesley, Charles
Whitefield, George
Coke, Thomas
Huntingdon, Selima Hastings
Asbury, Francis
Clarke, Adam
Emory, John
Fowler, C. H.
Haven, E. O.
Haven, Gilbert
Hurlbut, J. L.
Hurst, John F.
Moore, D. H.
Moore, Henry
Newman, J. P.
Ouseley, G.
Punshon, W. M.
Sankey, Ira D.
Strong, James
Taylor, W.
Tefft, B. F.

Townley, James
Townsend, L. T.
Vincent, J. H.
Walden, J. M.
Warren, H. W.
Watson, R.
Wise, Daniel

(*d*) CONGREGATIONALIST:

Congregationalism
Puritans
Separatists
Browne, Robert
Robinson, John
Cotton, John
Mather, Richard
Hooker, Thomas
Edwards, Jonathan
Hopkins, Samuel
Bellamy, Joseph
Dwight, Timothy
Abbott, Lyman
Bartlett, S. C.
Beecher, Henry Ward
Beecher, Lyman
Bissel, E. C.
Bushnell, H.
Dexter, H. M.
Finney, C. G.
Gladden, W.
Park, E. A.
Parker, Joseph
Phelps, Austin
Storrs, R. S.
Taylor, N. W.

(*e*) BAPTIST:

Baptists
Baptism
Baptism, Infant
Anabaptists
Münzer, T.
John of Leyden
Mennonites
River Brethren
Burrage, H. S.
Conant, T. J.
Hall, R.
Lorimer, G. C.
Peters, M. C.
Ripley, H. J.
Robinson, E. G.
Spurgeon, C. H.
Vedder, H. C.
Wayland, F.

(*f*) LUTHERAN:

Lutheranism
Reformation, The Protestant
Luther
Melanchthon
Augsburg Confession
Greenwald, Emanuel
Muhlenberg, H. M.
Muhlenberg, J. P. G.
Seiss, J. A.
Stuckenberg, J. H. W.

(*g*) DUTCH REFORMED:

Reformed Church in America
Belgic Confession
Heidelberg Catechism (under Catechism)
Dort, Synod of
Classis
Ferris, I.
Riddle, M. B.

(*h*) QUAKER OR FRIENDS:

Friends
Fox, George
Penn, William
Hicks, Elias
Gurney, J. J.
Wilbur, John

(*i*) UNITARIAN:

Unitarianism
Arius
Socinus
Servetus, Michael

Biddle, John
Priestley, Joseph
Allen, J. H.
Chadwick, J. W.
Channing, W. E.
Collyer, Robert
Freeman, James
Frothingham, O. B.
Hill, Thomas
Parker, Theodore
Savage, M. J.
Ware, Henry

(*j*) UNIVERSALIST:
Universalism
Relly, James
Murray, John
Ballou, Hosea
Hanaford, Phebe A.

(*k*) MORMON:
Mormons
Smith, Joseph
Pratt, Orson
Rigdon, S
Taylor, John
Woodruff, W.
Young, Brigham

(*l*) OTHER DENOMINATIONS:
Adventists
Miller, William
Christian Catholic Church
Christians
Christian Science
Disciples of Christ
Eddy, Mary Baker Glover
Evangelical Alliance
German Baptist Brethren
German Evangelical Protestant Church
German Evangelical Synod of North America
Institutional Church
Moravians
Brethren, Bohemian
Huss, John
Comenius, J. A.
Zinzendorf, Nikolaus
Reformed Church in the United States.
United Brethren in Christ
Otterbein, P. W.
Evangelical Association

III. MOḤAMMEDANISM.

The history of Islam is closely connected with the history of the nations which adopted it as their creed. Though the spread of Mohammedanism has at all times been to some extent due to missionary zeal, its extension has largely been coincident with conquests. The political aspect of Moslem history may be best studied under the names of Mohammedan nations, dynasties, and rulers, such as ABBASIDES, OMMIADS, SELJUKS, TURKEY, ARABIA, etc. Here are only given the leading titles dealing with the religious development and present character of the faith.

For the Rise of Islam, see:
Mohammed
Mohammedanism
Mohammedan Sects
Islam
Mecca
Medina
Hejira
Ayeshah

For the successors of Mohammed and early conquerors who spread the gospel of Islam in Asia, Africa, and Europe, see:
Caliph
Abu-Bekr
Omar

Othman
Ali
Ommiads
Khalid
Musa ibn Nusair
Amr ibn al-Asi
Tarik
Idrisites
Aghlabids
Fatimites
Almoravides
Almohades

For the tenets and practices of the faith, in addition to the titles already quoted, see:

Koran
Sunna
Hadith
Kaaba
Hajj
Hajji
Fast
Ramadan
Beiram
Muharram
Kiblah
Houri
Jinn
Iblis
Imam
Mufti
Muezzin
Ulema
Madrasah
Marabouts
Mosque

For Sects and Parties, see:

Sunnites
Shiites
Hasan and Husain
Mahdi
Nosairians
Assassins
Druses
Hakim ibn Allah
Mutazilites
Sincere Brethren
Wahabis
Dervish
Babism
Sufiism
Senussi

For Mohammedan Theologians:

Abu Hanifah
Ibn Hanbal
Ibn Tumart
Ghazali

Chapter 7. Education

THE study of the science of education is peculiarly related to the study of the growth and development of the intellectual, moral, and spiritual life of the human race. Every department of knowledge is necessarily in some way connected with the science of education. Most of the great thinkers of all ages have contributed to the literature of the science, and consequently many names must be included in our list of educators which appear, as well, in some other field. As part of some one philosophical system or another, education goes back to early times, but its history as an independent science, separated from philosophy or theology, is quite recent. Its problems, too, have grown immeasurably more complex with the progress of democratic ideals and the widening of its sphere of interest. More even than national defense, the fostering of public education has come to be the great function of the modern State; and, though differences of opinion prevail as to how far this obligation extends in practice, in all progressive countries there is no class of men whom the government, in one way or another, does not attempt to supply with the means of education.

There are three sides from which students may approach the study of the science: the historical, the psychological, and the pedagogical.

The History of education is outlined in the Article EDUCATION, which traces its development from the dawn of civilization to the present day. A more detailed study of the subject may be systematically pursued in the following lists of articles. The subject is usually divided into four periods: Pre-Christian (including the Oriental and the Classical types), Early Christian, Mediæval, and Modern.

I. THE PRE-CHRISTIAN PERIOD.

(*a*) The several types of Oriental education are discussed in the following articles:

Confucius
Buddhism
Caste
Jews
Talmud
Rabbi
Mohammedanism
Ulema
Mufti
Madrasah

(*b*) The aims of Greek and Roman educators, and the methods by which they strove to attain their ideals, are discussed under the following heads:

Sophists
Socrates
Plato
Aristotle
Xenophon
Cyropædia
Sparta
Games
Plutarch
Quintilian

II. THE EARLY CHRISTIAN PERIOD.

The part played by the early Christian Fathers in the furtherance of education and the establishment of schools will be found under:

Catechumens
Catechetical Schools
Chrysostom
Basil the Great
Clement of Alexandria
Origen
Theodore of Mopsuestia

For the struggle between the pagan and early Christian educators, see:

Tertullian
Augustine

These bring the student up to the Mediæval period.

III. The Mediæval Period.

In the series of articles dealing with this period, the student will find an account of the efforts made by the Church to promulgate education throughout Christendom, and will be led up to the modern movement, which properly co-extends with the movement that led up to and through the Reformation. See:

Monasticism
Benedictines
Arts, Liberal
Quadrivium
Trivium
Scholasticism
Charles the Great
Alcuin
Alfred the Great
Abélard
Chivalry
University

IV. The Modern Period.

Educational progress was hastened and turned into varying channels by the revival of the old learning. The Reformation initiated the separation of education from theology, and, by breaking up the unit of European culture, gave rise to national systems of education and the use of the national vernaculars as the medium of instruction. For the early educational reformers, see:

Renaissance
Humanism
Dante
Petrarch
Boccaccio
Poggio Bracciolini
Pico della Mirandola
Poliziano
Reuchlin
Erasmus
Budæus
Scaliger, J. J.
Scaliger, J. C.
Casaubon, I.
Hardouin, J.
Reformation, The Protestant
Luther
Melanchthon
Sturm, Johannes
Ascham, Roger
Rabelais
Montaigne
Bacon, Francis
Induction
Ratichius
Comenius
Orbis Pictus

The efforts of the Catholic Church to counteract the effects of the Reformation may be studied in the following articles:

Ignatius of Loyola
Jesuits
Ratio Studiorum
Jansenism
Port-Royal-des-Champs

For the activity of the Church in supplying education to the very young, see:

La Salle, Jean Baptiste de
Brothers of the Christian Schools

For writers who contributed to the advancement of the science of education, see:

Milton, John
Locke, John
Fénelon, François

The realistic movement in education begins with FRANCKE, and the Realschule had its inception in his efforts. The movement culminates in the thorough sweeping away of old methods and ideas in education, foreshadowed in Rousseau's protest in his *Emile*. See:

Francke, A. H.
Rousseau
Emile
Basedow
Pestalozzi
Girard, J. B.
Jacotot
Fröbel
Kindergarten
Herbart
Mann, Horace
Spencer, Herbert
Arnold, Thomas
Bell, Andrew
Lancaster, Joseph

The systems of education prevalent in Europe and America are treated with great minuteness in the article on NATIONAL EDUCATION, SYSTEMS OF. The subject is further amplified in the sections on Education of the articles on the various countries of the world, wherein the statistical side is emphasized. The various phases of State activity receive full attention in the following articles:

Schools
Public Schools
Evening Schools
Secondary Schools
High Schools
Grammar Schools
Gymnasia
Realschule
Women, Education of
Negro Education
Industrial Schools
Vacation School
Education, Colonial

V. PEDAGOGY.

Pedagogy is that branch of the science of education which deals with the methods and means of carrying out educational ideas. The old and the new educational methods receive comprehensive treatment in the article PEDAGOGY, which is amply supplemented by the following articles:

Nature-Study
Child Psychology
Object Teaching
Curriculum
Kindergarten
Physical Education
Manual Training
Normal School
Education, Commercial
Technical Education
Professional Education
Theological Education
Medical Education
Legal Education
Agricultural Education
Seminar
Privat-Docent
Reading
Spelling

VI. EDUCATIONAL INSTITUTIONS.

The growth of colleges and universities in Europe and America is treated from the general standpoint in the

article on UNIVERSITY. This is supplemented by separate accounts of all of the important colleges and universities in the world. The list of American colleges and universities is especially complete; to such an extent, indeed, that mention may be made of only a few of the most prominent. See:

University
College
Colleges, American
Carnegie Foundation
General Education Board
Curriculum
Elective Courses
Degree
Diploma
Examination
Fellowship
University Extension
Harvard University
Yale University
Princeton University
Columbia University
Pennsylvania, University of
Brown University
Cornell University
Johns Hopkins University
Clark University
Chicago University
Leland Stanford Junior University
Catholic University of America
Amherst College
Bowdoin College
Dartmouth College
William and Mary College
Williams College
Girard College
Carnegie Institution

. The State universities have all been written up in detail.

For a group of women's colleges in the United States, see:

Barnard College
Bryn Mawr College
Goucher College
Mount Holyoke College
Radcliffe College
Smith College
Vassar College
Wellesley College

In this connection see also:

Collegiate Education of Women
Coeducation

For English universities and schools, see:

Oxford University
Rhodes Scholarships
Cambridge, University of
London University
Liverpool, University of
Manchester, University of
National University of Ireland
Dublin University
Girton College
Newnham College
Eton College
Rugby School
Harrow School
Shrewsbury School
Winchester College

For the greatest of European universities, either in present importance or historically, see:

Paris, University of
Berlin, University of
Vienna, University of
Madrid, University of
Munich, University of
Moscow, University of
Leipzig, University of
Edinburgh, University of
Heidelberg, University of
Bologna, University of
Padua, University of

Salerno, School of
Coimbra, University of
Salamanca, University of
Montpellier, University of
Prague, University of

A partial list of prominent educators of the modern times includes:

Adams, C. K.
Ames, J. B.
Andrews, E. B.
Angell, J. B.
Arnold, T.
Barnard, F. A. P.
Barnard, Henry
Bascom, J.
Brown, E. E.
Butler, N. M.
Clayton, P. P.
De Garmo, C.
Dewey, John
Drisler, Henry
Eliot, C. W.
Gildersleeve, B. L.
Gilman, D. C.
Hadley, A. T.
Hadley, James
Hall, G. S.
Hanus, P. H.
Harkness, A.
Harper, W. R.
Harris, W. T.
Hill, D. J.
James, E. J.
James, W.
Jebb, Sir R. C.
Jordan, D. S.
Jowett, B.
Low, Seth
Lyon, Mary
McCosh, J.
McMurry, F. M.
Monroe, Paul
Pattison, Mark
Patton, F. L.
Quick, R. H.
Sadler, M. E.
Schurman, J. G.
Sidgwick, Mrs.
Washington, Booker T.
Wendell, Barrett
West, Wm. A.
Wheeler, B. I.
White, A. D.
Whitney, W. D.
Wirt, Wm. A.
Young, Ella Flagg

For classes of institutions that have become centres for the spread of popular education, see:

(*a*) Libraries:
New York Public Library
Book
Alexandrian Library
Bodleian Library
British Museum
Bibliothèque Nationale
Library of Congress

(*b*) Museum

8. Philosophy and Psychology

THOUGH great diversity exists as to the meaning and scope of the term Philosophy, two definitions may be given as representative. The more modern view regards philosophy as the sum of all scientific knowledge, or the systematization of results obtained in the individual sciences; the historical and more prevalent view looks upon philosophy as the search for the ultimate nature and meaning of the universe, and especially of human life. Embracing at one time the totality of scientific knowledge, the field of philosophy has steadily grown narrower with the erection of independent sciences, until at the present day it includes the studies of metaphysics, logic, ethics, and æsthetics. Psychology is the latest branch of investigation to achieve its emancipation from philosophy, whose methods, historically, have been quite different from those that prevail in the scientific world to-day.

I. 1. The problems of philosophy are best studied, perhaps, historically. A brief summary, however, in necessarily technical language, will serve to present the main outlines of the subject in the form in which they have appeared to thinkers of different ages. Generally, then, the problems of philosophy are divided into three classes: those which deal with the ultimate nature of the universe, grouped under the heading METAPHYSICS; those which deal with the forms of human knowledge and its relation to reality, known as epistemology, or the theory of knowledge; and those dealing with human conduct, included in the science of ethics. See:

Philosophy
Metaphysics
Knowledge, Theory of
Ethics

2. The inquiry into the nature of reality takes on two forms: that concerned with the ultimate nature of things, and that dealing with the connection between things, or the architectural plan of the universe.

(*a*) For the First, see:

Ontology
Dualism
Monism
Materialism
Mechanism
Realism
Idealism

(*b*) For the Second, see:

Atomism
Theism
Transcendentalism
Pantheism
Body and Mind
Parallelism
Substance
Form
Causality
Time
Space
Teleology
Infinite
Absolute

3. In connection with our knowledge of the universe, two questions arise: (a) Taking the conglomeration of ideas we call knowledge, is there an outside Reality corresponding to them,

or are they Reality itself; and (b) are these ideas in origin the result of experience, or are they independent of experience? See:

(*a*) Realism
Idealism
Skepticism

(*b*) Empiricism
Rationalism
A priori
Dialectic
Category
Induction
Deduction

II. 1. The history of European philosophy begins with the Greeks, in whom, however, strong Oriental influences are traceable. Their earliest philosophy was a nature philosophy, and its two great problems were those of Being and Becoming. See:

Greek Philosophy
Thales
Anaximander
Anaximenes
Eleatic School
Xenophanes
Parmenides
Zeno (the Eleatic)
Gorgias
Heraclitus
Pythagoras
Pythagoreanism
Neo-Pythagoreanism
Archytas
Metempsychosis
Empedocles
Anaxagoras
Atomism
Leucippus
Democritus

2. In the second period, the main interest of philosophy becomes anthropological or ethical, the tendency being most fully apparent in the figure of the great teacher Socrates, from whom descend the great schools of the Hellenistic world, Platonists, Stoics, Hedonists, Cynics. Plato and Aristotle by their genius moulded almost the channels in which philosophic thought was to flow in the future. Greek philosophy, toward its end, exerted a powerful influence on Christianity. See:

Sophists
Protagoras
Socrates
Hedonism
Cyrenaic School
Aristippus
Hegesias
Epicurus
Epicureanism
Lucretius
Stoics
Zeno (the Stoic)
Cleanthes
Chrysippus
Seneca
Epictetus
Aurelius, Marcus
Cynics
Antisthenes
Diogenes
Euclid (of Megara)
Plato
Academy
Arcesilaus
New Academy
Carneades
Aristotle
Peripatetic Philosophy
Pyrrho
Ænesidemus
Sextus Empiricus
Skepticism

Neo-Platonism
Philo Judæus
Ammonius
Plotinus
Porphyrius
Iamblichus
Proclus
Boëthius
Anima Mundi
Logos
Eclecticism
Cicero

3. From the Platonic philosophy, as contained in the writings of the Christian Fathers, mediæval philosophy developed into the system known as Scholasticism, which in its fullest development, however, became Aristotelian, through the influence of the Arabian philosophers. Philosophy became the handmaiden of theology, and it supported the mysteries of the Christian faith by means of a subtle dialectic. The downfall of scholasticism began with the fourteenth century, and was hastened by the Revival of Learning. See:

Scholasticism
Augustine (of Hippo)
Erigena
Rabanus Maurus
Peter Lombard
Realism
Anselm of Canterbury
Guillaume de Champeaux
Nominalism
Roscelinus
Durandus
Occam, William of
Buridan, Jean
Ailly, Pierre d'
Concept
Abélard
Averroës
Avicenna
Albert of Bollstädt
Alexander of Hales
Vincent of Beauvais
Aquinas, Thomas
Duns Scotus
Suárez, Francisco
Mysticism
Hugo of St. Victor
Bernard of Clairvaux
Bonaventura, St.
Eckhardt
Tauler
Kempis
Böhme
Quietism
Molinos
Bacon, Roger
Lully, Raymond
Cusa, Nikolas
Renaissance

The Revival of Learning brought about a temporary revival of the classic philosophies, but these served only to bridge over the chasm between the ancient thought and the modern philosophy, whose beginning dates from the establishment of Empiricism by Bacon and Rationalism by Descartes. The subjects of Substance and Causality now assume leading importance. Cartesian rationalism ends in dogmatism on the Continent; empiricism ends in skepticism in England. See:

Bruno, Giordano
Campanella, T.
Gassendi
Rationalism
Descartes
Malebranche
Occasionalism
Spinoza
Pantheism
Leibnitz

Preëstablished Harmony
Monad
Wolff, Christian
Baumgarten, A. G.
Eberhard, J. A.
Mendelssohn, Moses
Vico, G. B.
Empiricism
Hobbes, Thomas
Locke, John
Sensationalism
Clarke, Samuel
Butler, Joseph
Paley, William
Berkeley, George
Cambridge Platonists
Cudworth, Ralph
More, Henry
Hume, David
Charron, Pierre
Toland, John
Hartley, David
Priestley, Joseph
Condillac
La Mettrie
Diderot
D'Alembert
Helvétius
Holbach
Cabanis, J. P. G.
Genovesi, A.
Enlightenment, Philosophy of the
Common Sense, Philosophy of
Reid, Thomas
Beattie, James
Stewart, Dugald
Hamilton, William

The critical philosophy of Kant sought to mediate between Rationalism and Empiricism by assigning to either its proper function in the mental life; and, though Kantianism was followed by the rise of great rationalistic systems in Germany, in which the balance was overthrown anew, the teachings of the Königsberg philosopher have shown the greater vitality as being in consonance with the spirit of the growing sciences. Reaction against unrestrained idealism led to Positivism, in which philosophy becomes a correlation of sciences. Materialism, after a brief popularity, seems to have passed away forever. See:

Kant
Herder
Jacobi, F. H.
Hamann, J. G.
Krause, K. C. F.
Reinhold, C. E.
Rosenkranz, K.
Erdmann, J. E.
Trendelenburg
Zeller, E.
Ulrici, H.
Fischer, Kuno

For the important systems that arose after Kant, see:

Fichte, J. G.
Fichte, I. H.
Schelling
Hegel
Feuerbach, L. A.
Green, T. H.

And for a philosophy of will that has exercised a profound influence on modern thought:

Schopenhauer
Pessimism
Hartmann, Karl Robert

Materialism was fostered by the doctrine of evolution and the Darwinian discoveries. See:

Moleschott, J.
Büchner, F. L.
Vogt, Karl
Haeckel, E.

For the neo-Kantianism of the latest scientific thought, see:

Lange, F. A.
Cohen, Herman
Du Bois-Reymond, E. H.
Helmholtz
Virchow
Wundt
Renan
Taine

For systematic attempts at reconciling philosophy and religion, see:

Schleiermacher
Ritter, Heinrich
Rosmini-Serbati
James, Wm.

For philosophies that have been made the basis of important pedagogical psychologies, see:

Herbart
Flügel, O.
Beneke
Lotze
Fechner
Paulsen, Friedrich

Spiritualism had influential exponents in France in the beginning of the nineteenth century. See:

Royer-Collard
Cousin, Victor
Maine de Brian
Jouffroy, T. S.
Psychical Research
Myers, F. W. H.

Spiritualism found its reaction in the epoch-making work of Comte. See:

Positivism
Agnosticism
Comte
Littré
Mill, J. S.
Spencer, Herbert
Lewes, G. H.
Harrison, Frederic
Riehl, A.

For philosophic thought in America, see:

Edwards, Jonathan
Trascendentalism
Emerson, R. W.
Ripley, G.
Alcott, A. B.
Channing, W. E.
Thoreau, H.
McCosh, J.
Harris, W. T.
Royce, J.
James, Wm.
Ladd, G. T.
Dewey, J.

Every well-rounded philosophical system has its logic, ethics, and æsthetics, and strictly speaking these cannot be divorced from the discussions of purely metaphysical problems. Nevertheless, as important subdivisions of philosophy, they have received an amount of attention that give them independent consideration.

A. The problems of human conduct are discussed minutely in the general article on ETHICS, and further differentiated in subsidiary articles. See:

Ethics
Will
Free Will
Casuistry
Chance
Fatalism
Determinism
Indifferentism
Egoism
Altruism
Energism

Eudæmonism
Intuitionism
Categorical Imperative
Utilitarianism
Hutcheson
Bentham, J.
Austin, J.
Mill, J. S.
Nietzsche, F.
Stephen, Leslie
Sidgwick, H.
Martineau, J.
Green, T. H.
Caird, E.
Alexander, Samuel
Fouillée
Simmel, G.

B. The formal rules of thought as outlined by Aristotle have received modifications at the hands of both rationalists and empiricists, the influence of the latter being, however, the more pronounced on the development of the science. See:

Logic
Knowledge, Theory of
Induction
Deduction
Argument
Syllogism
Analysis
Synthesis
Abstraction
Hypothesis
Judgment
Definition
Division
Percept
Concept
Connotation
Denotation
Obversion
Opposition
Comparison
Analogy
Identity, Law of
Fallacy
Dilemma
Mill J. S.
Jevons
Whately, R.

C. The separate science of æsthetics dates only from the eighteenth century. Its latest development has been along experimental and anthropological lines. See:

Æsthetics
Æsthetics, Experimental
Baumgarten, A. G.
Lessing, G. E.
Shaftesbury, third Earl of
Hogarth
Bain
Bosanquet
Santayana, George

D. The psychology of the present differs from earlier investigations of the human mind in its application of a more rigorous scientific method. It assumes no metaphysical substratum for mental life, but is content to take experience as its ultimate fact and to study its forms and manifestations. Though the science is to be dated only from the latter half of the nineteenth century, it has already been found necessary to divide the field of investigation for the purpose of the more effective study of the mind of the adult, the child, and the abnormal individual, and the collective mind of the crowd. The method of psychology is ultimately introspective, but it is introspection carefully pursued and corrected by the standard of the scientific average. For classification and methods, see:

Psychology

Individual Psychology
Genetic Psychology
Child Psychology
Social Psychology
Folk-Psychology
Insanity
Psychology, Experimental
Psychological Apparatus
Psychophysics
Introspection
Phrenology

With mental experience as basis for analysis, psychology finds that the analytical element of mental life is sensation, and sensations depend on bodily processes set in motion by external stimuli. Sensations are classified according to the organs whose stimulation they accompany. For mind in general, and its relation to body, see:

(*a*) Mind
Elements, Conscious
Mental Process
Self
Self-Consciousness
Unity of Consciousness
Double Consciousness
Sleep
Dreaming
Hypnotism
Autosuggestion
Somnambulism
Consciousness
Noetic Consciousness
Meaning
Body and Mind
Subconsciousness
Subliminal Consciousness
Cerebration, Unconscious

(*b*) For Sensation, see:
Sensation
Sensorium
Intensity of Sensation
Extension
Duration
Quality
Discrimination, Sensible
Contrast
Reaction
Weber's Law
Limen
Relativity, Law of

(*c*) For a Classification of Sensations, see:
Vision
Visual Sensation
Blind Spot
After-images
Illusion
Mirage
Hallucination
Clairvoyance
Apparition
Color
Saturation
Color-Blindness
Audition
Clang-Tint
Colored Hearing
Fusion
Smell
Taste
Touch
Cutaneous Sensations
Static Sense
Muscle Sense
Muscle-Reading
Pain
Fatigue
Common Sensation
Organic Sensations

From simple sensations the higher intellectual processes (perception, idea, association of ideas, etc.) are synthetized. A corresponding process has

been brought forward as the analytical element of our emotional life, and has been denominated Affection. From a combination of sensational and affective elements arise the various processes classified under the general designation, Will. It is thus that the new psychology improves upon the threefold division of Intellect, Reason, and Will in the older psychology. See:

Affection
Conation
Attention
Effort
Interest
Tendency
Disposition
Faculty
Mental Constitution

(*a*) For the Complex Sensational Processes:

Perception
Idea
Movement, Perception of
Locality, Perception of
Distance, Perception of
Figure
Rhythm
Melody
Association of Ideas
Retention
Reproduction of Ideas
Memory
Apperception
Recognition
Familiarity
Apprehension
Imagination
Judgment
Ratiocination
Understanding
Abstraction
Intellect

(*b*) For the Affective or Emotional Processes:

Feeling
Emotion
Mood
Temperament
Mental Constitution
Sentiment
Sympathy
Antipathy
Fear
Anger
Belief
Expectation
Expression
Laughter
Language
Gesture

(*c*) For the Will Processes:

Will
Action
Instinct
Impulse
Desire
Habit
Practice

In the field of experimental investigation, Germany holds the first rank. Excellent work has been done in France, especially in the field of abnormal psychology, and in England and America, where German thought has blended with the native empiricism. See:

(*a*) Weber, E. H.
Fechner, G. T.
Helmholtz, H.
Hering, E.
Flechsig, P. E.
Stumpf, K.
Müller, G. E.

Wundt, W.

(*b*) Bain, Alexander
Romanes, G. J.
Galton, F.
Stout, G. F.
Sully, James

(*c*) Binet, A.
Charcot, J. M.
Ribot, T. A.

(*d*) James, William
Ladd, G. T.
Münsterberg, H.
Dewey, John
Titchener, E. B.
Baldwin, J. M.
Hall, G. S.

Chapter 9. Language and Literature

THE tracing of the mutual relations of the various languages of the world, and the study of their similarities and differences, is the task of the science of comparative philology. The phonetic, or mechanical side, the inflectional, or constructive, and the syntactic, or psychological aspect, are the three factors which combine to form human speech. See:

A. Language

1. PHILOLOGY.
Philology
Grammar
Dialect
Phonetics
Accent
Phonetic Law
Grimm's Law
Verner's Law
Etymology
Grassman's Law
Inflection
Declension
Comparison
Nouns
Name
Gender
Adjective
Pronoun
Article
Adverb
Preposition
Conjunction
Interjection
Verb
Participle
Conjugation
Reduplication
Ablaut
Umlaut
Syntax, Figures of
Sentence
Semasiology
Slang
Metaphor
Orthography, Figures of
Prosody
Rhyme
Assonance
Alphabet
Inscriptions
Paleography
Runes
Spelling
Rhetoric
Pronunciation
Phonetics

2. For a classification of languages in related groups, see:

(*a*) *For the Monosyllabic Type:*
Chinese Language

(*b*) *For the Agglutinative Type:*
African Languages
Egyptian (under Egypt)
Coptic (under Copts)
Ural-Altaic
Finnish Language
Turkish Language
Japanese Language
Dravidians
Tamils
Telugus
Philippine Languages

(*c*) *For the Polysynthetic Type* (*Incorporating*):
American Indian (under Indians, American):

(*d*) *For the Inflectional Type:*
Semitic Languages
Cuneiform Inscriptions
Aramaic
Syriac Language
Samaritan Language
Moabitish Language (under Moabite Stone)
Arabic Language

Inflectional also are:

(i) Indo-Germanic Languages

(ii) The Languages of India:
Sanskrit
Pali
Prākrit
Assamese (under Assam)
Bengali
Ceylonese (under Ceylon)
Gujarātī
Hindustani
Kashmiri
Maldive
Marathi
Panjabi
Sindhi
Uriya

(iii) The Iranian Languages:
Iranian Languages
Old Persian
Avesta
Pahlavi
Persian
Afghan
Baluchi
Kurdish
Ossetic

(iv) Armenian

(v) Albanian

(vi) Mediterranean Languages:
Greek
Italic Languages
Latin
Italian
Spanish
Norman French
French
Provençal
Rumanian
Portuguese

(vii) The Teutonic Languages:
Teutonic Languages
Gothic
Icelandic
Norwegian
Swedish
Dutch
German
Plattdeutsch
Frisian
Flemish
Anglo-Saxon
English
Americanisms

(viii) The Celtic Languages:
Celtic Languages
Cornish

(ix) The Balto-Slavic Languages:
Old Prussian
Lettic
Lithuanian

(x) The Slavic Languages:
Slavic Languages
Old Church Slavic
Polish
Russian
Czech or Bohemian Language

See also:
International Languages
Esperanto
Volapük

3. For the great names in the field of comparative philology, see:

Ascoli, G. I.
Bopp, F.
Brugmann, F. K.
Breal, M.
Bugge, S.
Burnouf, E.
Grimm, J. L. K.
Grundtvig, S. H.
Kölbing, E.
March, F. A.
Menéndez Pidal, R.
Meillet, A.
Paris, G.
Pott, A. F.
Rask, R. K.
Rousselot, Abbé
Schlegel, F.
Schleicher, A.
Schmidt, J.
Sievers, E.
Skeat, W. W.
Stokes, W.
Sweet, H.
Thomas, André Antoine
Taylor, W.
Verner, K. A.
Vigfusson, G.
Webster, Noah
Whitney, W. D.
Zeuss, S. C.

B. Literature

Literature, which is the expression, more or less permanent, in language, of human thought and emotions, would include in its widest sense every written record of man's activity, the university man's dissertation on the Coleoptera no less than Shelley's "Ode to the Skylark." Such a wide connotation of the term would render any classification within reasonable space limits impossible, and in the present chapter the matter has been restricted to the treatment of what we ordinarily call Belles-lettres. The great works in history and the various fields of science and philosophy will be accounted for in the chapters with the subject matter of which they are more intimately connected. A more considerable difficulty than that of settling limits to the scope of the term literature is that of determining a reasonably fixed standard of classification, owing to the twofold aspect under which every literary monument presents itself —as form or matter. Taking, for instance, any specific department of literature, such as satire, we find that our satirist may be, as regards form, a lyrist, novelist, essayist, or dramatic writer. The man we call poet may, in the same manner, have turned the poetic form to the uses of comedy or of the lyric spirit. Again, commonly, a literary artist will have attained eminence in different categories of literature, as the drama, say, criticism, and poetry, and the necessity arises of partially and often arbitrarily characterizing such a man. A certain measure of violence is, therefore, unavoidable when the attempt is made to cast any great literary figure into a rigidly labeled department; but there is sufficient justification for the scheme in the fact that, as a rule, the great literary figure does stand out preeminently in one department of the art,

and, remembering that the line of division is by no means rigid, we may classify him accordingly.

The historical study of literature may be pursued in two ways. There is the vertical order, as it may be called, in which we take up the national literatures one by one, a method of study in which the various literary genres are considered at the same time, and wherein the formal side is naturally subordinated to the investigation of the development of national character as revealed in the national literature. There is also what may be called the horizontal order, where our attention is confined to one kind of literature at a time, whose development is traced from the beginning to the present day, across national boundaries, the process essentially being one of thematic unity, as compared with the preceding method of national unity. Either method has its advantages, and the material in the *New International Encyclopædia* has been so treated as to lend itself to either form of study; but, whereas the student or reader who would devote himself to the study of national literatures may be left to his own resources in view of the obvious classification followed, the need for guidance is apparent in the second. Emphasis, therefore, in the present chapter is laid on the formal development of the literary form, the underlying principle being the belief that the larger number of students are apt to turn to a specialized subject, like the history of the novel or the epic, rather than to the expanded story of an entire national literature.

I. The National Literatures.

American Literature
Arabic Language and Literature
Armenian Language and Literature
Australian Literature
Bengali Language and Literature
Breton Literature
Canadian Literature
Catalan Language and Literature
Chinese Language and Literature
Cuban Literature
Czech Literature
Danish Language and Literature
Dutch Literature
Egyptian Language and Literature (under Egypt)
English Literature
Finnish Language and Literature
Flemish Language and Literature
French Literature
Frisian Language and Literature
German Literature
Greek Literature
Hindustani Language and Literature
Hungarian Literature
Icelandic Literature
Iranian Languages and Literatures
Irish Literature
Italian Literature
Japanese Literature
Jewish Language and Literature (under Jews)
Latin Literature
Lettic Language and Literature
Lithuanian Language and Literature
Mexican Literature
Norwegian Literature
Old Church Slavic Language and Literature
Pahlavi Language and Literature
Persian Literature
Polish Literature
Portuguese Literature
Portuguese-Brazilian Literature

Romance Literatures
Rumanian Language and Literature
Russian Literature
Scottish Language and Literature
Spanish Literature
Spanish-American Literature
Swedish Language and Literature
Syriac Language and Literature
Turkish Language and Literature
Yiddish

II. The Literary Forms. The broadest subdivision in literature according to form is that into prose and poetry; and, though it is often very difficult to differentiate one from the other in fact, and always hard to describe the distinction between them in theory, the common definitions of prose as the ordinary mode of speech and poetry as speech figurative, cadenced, and cast within certain comparatively rigid forms, may be followed safely enough for practical purposes. Either, taken in itself, may be subdivided into forms of narrower connotation, such as essay and novel under prose, epic and lyric under poetry. Here, however, appears the inconsistency already mentioned as inherent in literary classification; for the earliest scientific essays of the Greeks were written in verse, while Walt Whitman's lyric spirit finds expression in a medium closely akin to Ruskin's fervid prose. Again, the drama is probably nowadays regarded as a prose form, though as a matter of fact the world's greatest plays bear the poetic form. Poetry, then, if we exclude the drama, embraces the two subdivisions of the epic and the lyric. In the history of literary development, poetry precedes prose, and of the two poetic forms the epic, as a rule, antedates the lyric.

1. Epic Poetry. The epic may be defined as a lengthy narrative in verse, dealing with a subject of great magnitude in character, national or descriptive of a great movement. A distinction may be made between the epic which is the spontaneous expression of national life, constructed at an early period in national development out of pre-existing minor poetic forms, and the artificial epic of a more advanced cultural stage, which is the work of a single mind and in consequence purposive in its nature rather than spontaneous. Mention should also be made of the mock or beast epic, in nature largely satirical. See Epic Poetry; and, for the great epics and epic poets of the world's literature, the following titles:

Sanskrit:
Mahabharata
Rāmāyana
Purana

Persian:
Firdausi
Shah Namah
Rustam

Greek:
Homer
Age of Epic Poetry (under Greek Literature)
Cyclic Poets

Latin:
Vergil
Æneas
Lucan
Silius Italicus
Statius

French:
Chansons de geste

Roland
Aymon

SPANISH:
Cid, The
Ercilla y Zúñiga

GERMAN:
Nibelungenlied
Klopstock

ITALIAN:
Dante
Boiardo
Ariosto
Tasso

PORTUGUESE:
Camões

NORSE:
Edda
Saga

FINNISH:
Kalevala

ENGLISH:
Beowulf
Milton

THE BEAST EPIC:
Homer; Greek Literature
Reynard the Fox

2. THE LYRIC. Lyric poetry, as the expression of personal feeling, is the most subjective of all literary forms. Originally written to be sung, the lyric has remained the nearest approach in literature to absolute music. Its scope is as wide as human emotion, broadening in the course of its development with the expansion of human sympathies. Its formal variations are numerous. See:

Lyric Poetry
Versification
Sonnet
Ode
Ballade
Rondeau
Madrigal
Canzone
Rhyme
Vers Libre

Lyric poetry attained great perfection in ancient Greece, though its field was narrower than that of modern poetry for comparative lack of the nature element, which, with us, is so conspicuous a feature of lyric expression. The Roman genius was, on the whole, unfavorable to the fostering of the lyric spirit. In the East, Persia produced a succession of poets of great excellence. See, for the great names in the realm of lyric poetry:

SANSKRIT:
Kalidasa

PERSIAN:
Nizami
Omar Khayyam
Sadi
Hafiz
Jāmi

LATIN:
Catullus
Tibullus
Horace
Ovid
Propertius
Ausonius
Prudentius

GREEK:
Alcman
Callinus
Archilochus
Tyrtæus
Simonides
Solon

Alcæus
Sappho
Anacreon
Theognis
Hipponax
Pindar
Bacchylides
Timotheus
Theocritus
Bion
Moschus
Herondas

The lyric poetry of the Middle Ages was largely ecclesiastical, the Latin hymns of the period being especially marked by extraordinary effects of rhyme. The court singers of France and Germany, however, fostered the love theme assiduously. With the Revival of Learning came a great impetus to the poetic expression of secular emotions, Italy being the first to feel the impulse of the new movement. Lyricism languished during the domination of classical ideals in the seventeenth and eighteenth centuries, but, freed from the bond of artificiality, entered upon an unprecedented development towards the end of the latter century. See:

Hymnology
Troubadours
Trouvère
Minnesinger
Meistersinger
Goliardic Literature
Romanticism;

and for the lyric poets of Western Europe:

FRENCH:

Marie de France
Meung, Jean de
Villon
Marot
Malherbe
Pléiade
Ronsard
Chénier, Andre Marie
Chénier, Marie Joseph
Béranger
Lamartine
Delavigne
Hugo
Musset
Gautier
Leconte de Lisle
Baudelaire
Hérédia, José
Sully-Prudhomme
Verlaine
Mallarmé
Regnier, H.
Rimbaud, J. A.
Kahn, Gustave

PROVENÇAL:

Roumanille
Jasmin
Mistral, F.
Gras, Félix
Félibrige

ITALIAN:

Cavalcanti, Guido
Cino da Pistoja
Dante
Petrarch
Colonna, Vittoria
Guarini
Marini
Chiabrera
Metastasio
Bondi, Clemente
Foscolo, Ugo
Leopardi
Monti, V.
Aleardi
Giusti, Giuseppe

Carducci
Graf, A.

SPANISH:
Lopez de Ayala, Pedro
Santillana
Carcilasso de la Vega
León, Luis de
Figueroa, Francisco de
Argensola
Mendoza, Diego Hurtado de
Góngora y Argote
Zorrilla y Moral
Iriarte y Oroposa
Lista y Aragon
Melendez Valdes
Espronceda

PORTUGUESE:
Ferreira, A.
Gomes de Amorim

GERMAN:
Walther von der Vogelweide
Sachs, Hans
Fleming, Paul
Opitz
Bürger
Kleist, E. C.
Goethe
Schiller
Schlegel, A. W.
Arndt
Novalis
Chamisso
Uhland
Körner
Eichendorff
Heine
Rückert
Freiligrath
Bodenstedt
Scheffel
Auersperg
Hamerling
Ambrosius, Johanna

DUTCH:
Marnix
Vondel
Bilderdijk
Kate, J. J. ten
Eeden, F. Van

FLEMISH:
Maerlant
Bijns
Conscience, H.

The lyric poetry of Northern and Eastern Europe is recent in origin, dating from the eighteenth century. It has, as a rule, been under the influence of the great literary movements of the West, but, though largely mimetic in form, has been made the expression of national consciousness. See:

SWEDISH:
Bellman
Tegnér
Atterbom
Runeberg
Snoilsky

DANISH:
Heiberg, J. L.
Evald
Richardt

NORWEGIAN:
Welhaven
Wergeland

HUNGARIAN:
Kisfaludy
Arany
Petöfi
Erdélyi

RUSSIAN:
Derzhavin
Pushkin
Koltsov
Lermontov
Sheftchenko
Nekrasov

POLISH:

Naruszewicz
Karpinski
Mickiewicz
Kniaznin
Slowacki
Krasinski
Pol
Asnyck

The origins of the English lyric poetry may be traced back, if it be so desired, to early Anglo-Saxon times. The continuous history begins with Chaucer. Some of the most beautiful lyrics of the language are embodied in the works of the Elizabethan dramatists, after whom, and Milton, the art declines and hardens until revived by Burns and Wordsworth. English lyric in the nineteenth century has covered the field of human sympathies, from Blake's unseen world to Tennyson's studies in evolution and Kipling's in machine construction. See:

ENGLISH:

Cædmon
Ormulum
Layamon
Lydgate, John
Minot, Laurence
Barbour, John
Gower
Chaucer
Sackville
Shakespeare
Jonson
Milton
Ramsay, Allan
Donne
Herrick
Herbert
Waller
Crashaw
Cowley
Vaughan
Gay
Savage, Richard
Chatterton
Shenstone
Young, Edward
Thomson
Gray
Collins
Cowper
Blake
Burns
Hogg
Wordsworth
Landor
Moore
Keats
Shelley
Praed
Proctor, B. W.
FitzGerald
Tennyson
Browning
Clough
Arnold, Matthew
Ingelow, Jean
Patmore
Rossetti, Dante Gabriel
Rossetti, Christina
Morris
Arnold, Edwin
Swinburne
Massey, G.
Henley
Watson, W.
Kipling
Meynell, A. C.
Sharp, W.
Yeats, W. B.

AMERICAN:

Freneau
Barlow, Joel

Key
Halleck
Bryant
Drake
Emerson
Whittier
Longfellow
Holmes
Poe
Lowell
Hoffman, C. F.
Whitman
Cary, Alice and Phœbe
Timrod
Howe, Julia Ward
Stedman
Aldrich
Lanier
O'Reilly, J. B.
Field, Eugene
Riley
Miller, Joaquin
Moody, William Vaughan

3. The Drama. The Drama has been placed high among mimetic forms, because of the contribution it lays on the other arts, thus combining within itself their several qualities. Action and character are the subject matter. The means are bodily motion, which gives the sculptor's effect; language, which is the instrument of the poet; music, and scenery, and costume, to which painting and architecture give their share. The origins of the drama are to be found, most probably, in early religious ceremonial. Festivals marked by singing and dancing, the latter more or less symbolic in character, are common to peoples in a primitive stage; and the line of progress is along the development of the action and the spoken dialogue, at the expense of the chant, to complete secularization of the drama. The principles of the drama as propounded by Aristotle have remained for the most part the same; the mechanical technique has varied widely from original conditions. See:

Drama
Theatre
Stage
Chorus
Act
Ballet
Burlesque
Farce
Interlude
Masque
Vaudeville
Pantomime
Puppet
Atellanæ
Mime
Prologue
Epilogue

Greek drama had its origin in the worship of Dionysus. With Æschylus, tragedy is profoundly religious, and the actor's speeches are still subordinated to the choruses; Sophocles strengthened the element of action; Euripides thoroughly humanized tragedy. Attic comedy was fierce in personal satire and unbridled in speech. The Latin drama was sedulously modeled on the Greek. The origin of the Sanskrit drama is disputed, some deriving it from the Greek, others assigning it an independent development. See, for writers and plays:

Sanskrit:
Sūdraka
Kalidasa
Bhavabhuti
Śakuntalā
Mricchakatika

GREEK:
- Æschylus
- Phrynichus
- Sophocles
- Euripides
- Aristophanes
- Agathon
- Epicharmus
- Eupolis
- Menander

LATIN:
- Plautus
- Terence
- Seneca

In Mediæval times, practically the only species of dramatic performance was the religious spectacles of the Church, in which the purpose was didactic. See: MIRACLE PLAY; MORALITY; INTERLUDE; PASSION PLAY.

Out of the religious performances of the Middle Ages the modern drama developed. In France, which served as a model to the Continent, an elaborate system of rules was built up, supposedly bringing the drama into conformity with the standards of the classic age. The classic ideals, with their restriction of human emotions to kings and nobles, were overthrown on the Continent in the first half of the nineteenth century, since when the scope of the drama has been widened to embrace the entire complex of society. Like the novel, the drama of the latest days has become largely purposive. See, for the writers:

FRENCH:
- Mairet
- Regnard
- Corneille
- Racine
- Molière
- Marivaux
- Chénier, M. J.
- Crébillon
- Beaumarchais
- Scribe
- Vigny
- Hugo
- Legouvé
- Labiche
- Ponsard
- Augier
- Dumas
- Pailleron
- Meilhac
- Halévy
- Sardou
- Rostand
- Maeterlinck
- Brieux
- Comédie Française

ITALIAN:
- Trissino
- Maffei
- Goldoni
- Gozzi
- Alfieri
- Manzoni
- Giacometti
- Annunzio, G. d'

SPANISH:
- Encina
- Vega Carpio
- Calderon de la Barca
- Moreto y Cabaña
- Moratín, Leandro Fernández
- Gil y Zárate
- Lopez de Ayala, Adelardo
- Hartzenbusch, J. E.
- Echegaray
- Breton de los Herreros

PORTUGUESE:
- Sá de Miranda
- Almeida-Garrett

The primacy in Continental drama, long held by the French, is disputed at the present day by the Teutons and the Slavs, more particularly the Scandinavian branch of the Teutons. See:

GERMAN:
Lessing
Goethe
Schiller
Kotzebue
Grillparzer
Laube
Gutzkow
Anzengruber
Heyse
Sudermann
Hauptmann
Lindau, P.
Hartleben
Fulda

SWEDISH:
Almqvist
Strindberg

DANISH:
Holberg
Oehlenschläger

NORWEGIAN:
Ibsen
Björnson

RUSSIAN:
Sumarokov
Griboedov
Gogol
Ostrovski
Zagoskin, M. N.
Tolstoy, Alexei
Tolstoy, Liov
Gorky

POLISH:
Fredro
Kniaznin
Fredro the Younger

HUNGARIAN:
Kisfaludy, Károly
Katona
Szigligeti

While Continental Europe was enslaved by the rigid formulas of the classicists, in England the Romantic drama flourished from the beginning. The Elizabethan age is the golden age of the drama of the world. Following the Elizabethans came the decline, arrested partially by the talent of Dryden and Congreve during the Restoration, and of Goldsmith and Sheridan in the later part of the eighteenth century. In the nineteenth century, England brought forth no dramatic writer of conspicuous genius. See:

ENGLISH:
Udall
Norton
Sackville
Kyd
Lodge
Peele
Marston
Greene
Marlowe
Shakespeare
Nash
Dekker
Middleton
Jonson
Massinger
Beaumont and Fletcher
Ford
Webster
Davenant
Dryden
Wycherley
Otway
Congreve
Farquhar
Goldsmith

Sheridan
Knowles, J. S.
Beddoes, T. L.
Taylor, Tom
Robertson, T. W.
Sims, G. R.
Boucicault
Pinero
Jones, H. A.
Shaw, George Bernard
Phillips, Stephen
Barrie, J. M.
Galsworthy, John
Synge, J. M.
Masefield, John

AMERICAN:
Dunlap, William
Payne, John Howard
Brougham, John
Boker
Sargent, Epes
Carleton, Henry Guy
Howard, Bronson
Campbell, Bartley
Thompson, Denman
Harrigan, Edward
Belasco, David
Fitch, William Clyde
Moody, William Vaughan

A partial list of the more noteworthy actors, of all times and all nations, is as follows:

Anderson, Mary A.
Archer, Belle
Arnould, Sophie
Arthur, Julia
Bancroft, Mary E. W.
Barrett, Wilson
Barry, Elizabeth
Barry, Spranger
Bates, Blanche
Bellamy, George Anne
Bernhardt, Sarah
Betterton, Thomas
Betty, W. H. W.
Booth, Agnes
Booth, Barton
Booth, Edwin
Booth, Junius Brutus
Bracegirdle, Anne
Burbage, Richard
Campbell, Beatrice
Clarke, J. S.
Clive, Catherine
Coghlan, Charles
Coghlan, Rose
Coquelin, B. C.
Crane, W. H.
Cushman, Charlotte
Davenport, E. L.
Davenport, Fanny
Déjazet, P. V.
Devrient, L.
Drew
Duse
Farren, Elizabeth
Fisher, Charles
Fiske, Minnie M.
Florence, W. J.
Forbes-Robertson, J.
Forrest, Edwin
Garrick, David
Gilbert, J. G.
Gillette, W. H.
Goodwin, N. C.
Haase, F.
Hackett, James H.
Hading, Jane
Hare, John
Haworth, Joseph
Herne, James A.
Irving, Henry
Janauschek, Fanny
Jordan, Dorothy
Kean, Edmund
Kean, C. J.
Kemble, Chas.

Kemble, Frances Anne
Kemble, John Philip
Kendal, Mr.
Kendal, Mrs.
Lecouvreur, Adrienne
Lemaître, A. L.
McCullough, J. E.
Macklin, Charles
Macready, W. C.
Mansfield, Richard
Mathews, Charles
Mathews, C. J.
Modjeska, H.
Morris, Clara
Mounet-Sully
Oldfield, Anne
Payne, J. H.
Placide, H.
Rachel, Mlle.
Rehan, Ada
Réjane, Mme.
Ristori, A.
Robson, Stuart
Roscius
Russell, Sol Smith
Salvini, A.
Salvini, T.
Siddons, Sarah
Sonnenthal, A.
Sothern, E. H.
Stoddart, J. H.
Thompson, Denman
Tree, Beerbohm
Vestris, Mme.
Wallack, J. L.
Wallack, J. W.
Willard, E. S.
Woffington, Margaret
Wyndham, Charles

4. THE NOVEL. The novel, at present the most flexible of literary forms, though of recent date in its present character, traces back to early and multiple sources. The beast tale, common to all nations, the narrative of adventure, and the story of things supernatural, were the precursors of the novel. The love element becomes pronounced in the old Greek romances and assumes primary importance in the romances of the Middle Ages. The romance, it may be broadly put, passed into the novel, when the tale began to assume the character of a picture of contemporary life, a development to be assigned to the sixteenth century. See the article NOVEL.

The geat monuments and figures of pre-modern story-telling are the following:

SANSKRIT:

Dandin
Subandhu
Baṇa

ARABIC:

Arabian Nights

GREEK AND ROMAN:

Heliodorus
Ephesiaca
Daphnis and Chloe
Apuleius
Apollonius of Tyre
Petronius

In Mediæval times, the romance flourished, combining in itself elements of the epic, the beast fable, and the tale of adventure and of love. Materials were largely drawn from ancient history, and the stories gathered around great figures of antiquity and the early Middle Ages. See:

Romance
Fabliaux
Gesta Romanorum
Alexander, Legend of
Charlemagne Cycle of Romances

Chrestien de Troyes
Wace
Roman de la Rose
Perceval
Tristram
Lancelot of the Lake
Malory
Grail, The Holy
Merlin
Chaucer
Morte d'Arthur
Euphues
Amadis of Gaul

Romance lacked characterization and reality. With the appearance of tales embodying observation of real types and description of manners, the novel as it is to-day begins. The origin is generally placed in Spain, where the rise of the picaresque tale marks the first step in character delineation. The subsequent development is rapid to present conditions, when the novel has become the all embracing term for all prose fiction, realistic, romantic, adventurous, or didactic. See for the writers:

FRENCH:
Scudéry, Madeleine de
Lafayette, Marie Madeleine de
Scarron
Lesage
Voltaire
Genlis, Countess de
Prévost d'Exiles
Saint-Pierre
Stendhal
Balzac
Hugo
Dumas, the Elder
Sue
Erckmann-Chatrian
Kock, Paul de
Sand, George
Merimée, P.
Flaubert
Goncourt
Feuillet
Daudet
Loti, Pierre
Zola
Bourget
Margueritte, P.
Prévost, E. M.
France, Anatole

ITALIAN:
Boccaccio
Manzoni
Amicis
Fogazzaro, A.
Verga, G.
Annunzio, Gabriele d'
Farina, S.
Serao, Matilda

SPANISH:
Cervantes
Aleman
Valera y Alcalá Galiano
Galdos
Palacio Valdés
Alarcón
Pereda
Pardo Bazán

GERMAN:
Goethe
Fouqué
Gutzkow
Eichendorff
Alexis, W.
Hauff
Laube
Auerbach
Reuter, Fritz
Tieck, L.
Freytag
Storm, Theodor

Scheffel
Gerstäcker
Spielhagen
Anzengruber
Dahn
Heyse
Ebers
Frenssen

SWEDISH:
Rydberg
Bremer, Frederika
Strindberg

DANISH:
Blicher
Drachmann

NORWEGIAN:
Björnson
Lie
Kielland

HUNGARIAN:
Jókai
Eötvös

RUSSIAN:
Gontcharov
Pisemski
Gogol
Turgenev
Dostoyevsky
Tolstoy
Korolenko
Gorky
Chekhov

POLISH:
Kraszewski
Sienkiewicz
Orzeszkowa

Defoe began the line of great English novelists with what is still the greatest story of adventure in our literature. Fielding then perfected the form. Manners were acutely studied by a succession of women writers, who bridged the eighteenth and nineteenth centuries. Barren practically of the drama, the latter century found expression in the novel to as fully great an extent as in lyric poetry. See:

ENGLISH:
Behn, Afra
Defoe
Sterne
Smollett
Fielding
Richardson
Inchbald, Elizabeth Simpson
Godwin
Burney, Frances
Radcliffe, Ann
Edgeworth, Maria
Scott
Austen, Jane
Porter, Jane
Peacock, Thomas Love
Lover, Samuel
Borrow
Lever, Charles
Bulwer-Lytton
Gaskell, Elizabeth
James, G. P. R.
Thackeray
Marryat, Frederick
Dickens
Reade
Trollope
Kingsley, Charles
Eliot, George
Brontë, (Charlotte, Emily, Anne)
Collins, Wilkie
Blackmore
Oliphant, Margaret
Meredith, George
Morris, William
Du Maurier
Black, William

Hardy, Thomas
Stevenson, Robert Louis
Russell, W. C.
Ward, Mrs. Humphry
Moore, George
Hawkins, Anthony Hope
Kipling, Rudyard
Conrad, Joseph
Gissing, George
Hewlett, Maurice
Quiller-Couch, A. T.
Wells, H. G.
Bennett, Arnold
Galsworthy, John

The nineteenth century produced in America in the realm of fiction a master romancer, Cooper, two masters in their art, Hawthorne and Poe, and at least two talented exponents of modern realism, James and Howells. See:

Brown, Charles Brockden
Cooper
Poe
Hawthorne
Hale, E. E.
Howells
Harte, Bret
James, Henry
Cable, George Washington
Fawcett, Edgar
Grant, Robert
Jackson, H. H.
Melville, Herman
Tourgee, A. W.
Wilkins, Mary
Allen, James Lane
Page, Thomas Nelson
Garland, Hamlin
Stockton, Frank R.
Norris, Frank
Atherton, Gertrude
Wharton, Edith

5. CRITICISM AND ESSAY.

1. The principles underlying artistic endeavor have been discussed since early Greek times, and may be divided into two classes, the universal laws of artistic expression, which have always been accepted, and the minor theories, more limited in scope and applying generally to individual arts, which never have been accepted by all, and never will be. Plato first studied in a thorough manner the relations of art to reality. Aristotle's *Poetics* laid down the principles that have undergone no essential change since his time. On the other hand, the blending of the classic spirit with the Teutonic, and the subsequent rise of chivalry and romance, produced differences of opinion regarding subject, scope, and manner that are in full force at the present day. See:

Criticism
Realism and Naturalism
Romanticism
Impressionist School of Painting
Décadents
Symbolists

2. Criticism in the beginning found expression in both prose and verse; the modern tendency has been decidedly towards prose, though there is not wanting a Pope's *Essay on Criticism* to continue the succession from Horace's *Ars Poetica*. The usual form, then, in which criticism at present finds expression is the Essay. See: ESSAY, and for the writers:

GREEK:
Plato
Aristotle
Plutarch
Longinus

LATIN:
- Cicero
- Horace
- Seneca the Elder
- Varro
- Pliny
- Quintilian

FRENCH:
- Montaigne
- Saint-Évremond
- Corneille
- Boileau
- Voltaire
- Diderot
- Bayle
- Taine
- Cousin
- Lamartine
- Sainte-Beuve
- Michelet
- Sarcey
- France, Anatole
- Faguet, Emile
- Brunetière
- Lemaître, Jules
- Gourmont, Rémy de

ITALIAN:
- Dante
- Boccaccio
- Poliziano
- Vida
- Scaliger, J. C.
- Carducci, Giosuè
- De Sanctis, F.
- Gubernatis, A.
- Croce, B.

GERMAN:
- Reuchlin
- Winckelmann
- Gottsched
- Herder
- Lessing
- Schiller
- Schlegel, Friedrich
- Grimm
- Scherer, W.
- Menzel
- Bahr, Hermann
- Nordau, Max

DUTCH:
- Erasmus

DANISH:
- Rafn
- Brandes

RUSSIAN:
- Belinsky
- Pisarev

ENGLISH:
- Ascham
- Sidney
- Bacon, Francis
- Dryden
- Steele
- Addison
- Swift
- Johnson
- Pope
- Jeffrey
- Coleridge
- Wordsworth
- Lamb
- Hazlitt
- Wilson, John
- De Quincey
- Hunt, J. H. Leigh
- Carlyle
- Ruskin
- Arnold, Matthew
- Rossetti, W. M.
- Stevenson, Robert Louis
- Pater, W.
- Symonds, J. A.
- Saintsbury, George
- Stephen, Leslie
- Dowden, Edward
- Archer, William

Gosse, Edmund
Shaw, G. B.

AMERICAN:
Irving
Emerson
Ticknor, G.
Lowell
Fuller, Sarah Margaret
Curtis, G. W.
Whipple
White, Richard Grant
Hutton, Laurence
Mabie, Hamilton
Woodberry, George Edward
Winter, William

6. MORALISTS, SATIRISTS, AND HUMORISTS.

The study of human character and conduct has at all times received the attention of great minds, and what may be called ethical literature forms a very important part of the literature of the world. Near to constructive moralists, like Epictetus or Carlyle, stands the satirist, whose mission it is to combat the evil of degenerate times. The contemplation of the petty faults and incongruities of human character and action, so portrayed as to arouse laughter without arousing deep emotion of any kind, has always been a universal source of amusement. See:

GREEK AND ROMAN:
Aristophanes
Lucian
Epictetus
Ennius
Lucilius
Horace
Juvenal
Martial
Persius
Lucan
Tacitus
Petronius
Aurelius, Marcus

FRENCH:
Rabelais
Ménippée
La Bruyère
La Rochefoucauld
Pascal
Lesage
Voltaire
Chamfort, S. R.
France, Anatole

ITALIAN:
Jacopone da Todi
Aretino

SPANISH:
Quevedo y Villegas

GERMAN:
Fischart, Johannes
Brant
Hutten, Ulrich von
Epistolæ Obscurorum Virorum
Grimmelshausen
Rabener
Lichtenberg
Wieland
Tieck
Richter, Johann Paul
Reuter, Fritz

DUTCH:
Erasmus
Marnix

RUSSIAN:
Kantemir
Shtchedrin
Nekrasov

ENGLISH:
Langland (Piers Plowman)
Skelton
Bunyan
Butler

Dryden
Pope
Swift
Junius, Letters of
Arbuthnot
Byron
Carlyle
Smith, Sydney
Thackeray
Dickens
Calverley
Gilbert, W. S.
Mallock, W. H.
Lear, Edward
Jerome, Jerome K.
Shaw, G. B.

SCOTCH:
Dunbar
Barclay

AMERICAN:
Ward, Nathaniel
Franklin
Irving
Lowell
Holmes
Smith, Seba
Clemens, S.
Leland, C. G.
Locke, D. R.
Browne, C. F.
Bunner, H. C.
Shaw, H. W.
Stockton, F. R.
Nye, E. W.
Dunne, Finley Peter

7. ORATORY.

The art of eloquent persuasion is found among all primitive peoples where social bonds have become of some importance. Oratory attains its fullest development in the Greek democracies, where the citizen was called upon to take so considerable a share in the public life. The political and juristic genius of the Roman was likewise favorable to the development of the art. Pulpit eloquence had some of its greatest masters among the early Fathers of the Church, which has never been wanting in masterly exponents of its doctrines. A great period in the history of oratory was the age of the French Revolution, when, contemporaneously in England too, a succession of great orators lent lustre to the reign of George III. In the United States, the revolutionary period, and the period of rapid national growth, produced a brilliant series of orators, culminating in the classic triad, Clay, Webster, and Calhoun. At present oratory may be considered a declining art, especially as related to secular affairs; and, though its power over the multitude may still be felt in electoral campaigns, its influence in legislative bodies has largely passed away. See ORATORY; and, for the great orators of all ages:

GREEK:
Pericles
Gorgias
Isocrates
Lysias
Andocides
Isæus
Æschines
Demosthenes
Athanasius
Chrysostom
Basil the Great

ROMAN:
Cato of Utica
Hortensius
Cicero
Ambrose

FRENCH:
- Bossuet
- Bourdaloue
- Massillon
- Fénelon
- Mirabeau
- Barnave
- Vergniaud
- Guadet
- Danton
- Robespierre
- Royer-Collard
- Lamartine
- Lacordaire
- Thiers
- Gambetta
- Jaurès, J. L.

ITALIAN:
- Mazzini

SPANISH:
- Castelar

HUNGARIAN:
- Kossuth

ENGLISH:
- Taylor, Jeremy
- Baxter, Richard
- Whitefield
- Mansfield
- Burke
- Pitt, the Elder
- Pitt, the Younger
- Fox, C. J.
- Sheridan, R. B.
- Erskine, Lord
- Canning
- Bright, John
- Gladstone
- Drummond, Henry
- Spurgeon, C. H.

IRISH:
- Curran
- Grattan
- O'Connell
- Emmet

AMERICAN:
- Otis, James
- Henry, Patrick
- Lee, Richard Henry
- Ames, Fisher
- Channing, W. E.
- Randolph, John
- Wirt, William
- Benton
- Clay
- Webster
- Calhoun
- Hayne
- Everett
- Choate, Rufus
- Seward, W. H.
- Sumner, Charles
- Stephens, Alexander
- Beecher, H. W.
- Douglas, Stephen A.
- Evarts, W. M.
- Edmunds, George
- Conkling, Roscoe
- Ingersoll, Robert
- Brooks, Phillips
- Bryan, William Jennings
- Choate, Joseph H.

8. THE FABLE.

Probably it was the inhabitants of India who first ascribed human wisdom and language to animals. From India the fable passed westward, and, beginning with the Greek Æsop, we find practically the same scheme and contents in all European fabulists. **See:**

INDIA:
- Pancatantra
- Bidpai

ARABIAN:
- Lokman

GREEK:
Æsop

LATIN:
Phædrus

FRENCH:
Marot
La Fontaine
Perrault
Florian
Laboulaye

RUSSIAN:
Krylov

GERMAN:
Hagedorn
Gellert
Lessing
Grimm

NORWEGIAN:
Asbjörnsen
Moe

DANISH:
Andersen

ENGLISH:
Gay

9. PERSONAL LITERATURE.

This name may be applied to such productions as diaries, memoirs, letters, and "confessions" of distinguished men and women, or men and women whose experiences in life have been extraordinary. Written, it may be presumed, for the purpose of self-expression, they are valuable indexes of character, motives, and causes. See:

Letters in Literature
Aurelius, Marcus: Meditations
Augustine: Confessions
Sévigné, Marquise de
Saint-Simon: Mémoires
Rousseau: Confessions
Senancour: Obermann
Amiel
Selden: Table Talk
Pepys
Evelyn
Walpole, Horace
Chesterfield

10. JOURNALISM.

The press, which must be regarded as an important element in the literary life of any nation, may be studied under the following heads:

Periodical Literature
Journalism, College
Newspaper
Punch
Figaro
Times, The
Printing

A partial list of noteworthy names in journalism is as follows:

About, Edmond
Blowitz, Henri Georges
Bonner, Robert
Bowles, Samuel
Creelman, James
Curtis, W. E.
Dana, C. A.
Forbes, Archibald
Godkin, E. L.
Greeley, Horace
Halstead, Murat
Harden, Maximilian
Kennan, George
Labouchère, Henry
Lemon, Mark
Norman, Henry
Northcliffe, Lord
Pulitzer, Joseph
Raymond, H. J.
Reid, Whitelaw
Rochefort, Henri
Russell, W. H.
Sala, G. A. H.

Smalley, G. W.
Stanley, H. M.
Stead, W. T.
Steevens, G. W.
Taylor, Bayard
Traill, H. D.
Villiers, F.
Watterson, Henry
Weed, Thurlow
White, Horace
Wilkinson, H. S.
Young, J. R.

11. Miscellaneous Titles.

Manuscript
Manuscripts, Illumination of
Papyrus
Palimpsest
Paleography
Codex
Coster
Gutenberg
Fust
Elzevir
Manutius
Foulis
Encyclopædia
Dictionary
Larousse
Brockhaus
Copyright
Literary Property

Chapter 10. The Fine Arts

(Architecture)

THE study of the fine arts may be approached from one of three different points of view. The first of these is the historical, in which the student desires to obtain a comprehensive view of the art of a nation or of an entire period, its general characteristics and development. Another is the artistic, in which knowledge of a particular art or of some of its aspects is desired. A third is the biographical, in which the interest centres about an individual artist. To meet the first point of view, the *New International Encyclopædia* contains general articles treating the architecture, sculpture, painting, and minor arts of certain nations and periods. These general articles may best be divided into two groups: those treating the art of Oriental nations, whose artistic devlopment is remotely or not at all concerned with the general European evolution; and those dealing with the great periods of artistic development participated in by the Occident in general. This division obviates the necessity for general articles on the art of separate European countries, as, for instance, French art, which will be found treated under ROMANESQUE, GOTHIC, and RENAISSANCE ART, and in the general articles ARCHITECTURE, SCULPTURE, PAINTING. The artist's point of view is represented by general articles on Painting, Sculpture, and Architecture, and by articles on the various schools, and on technical terms and processes. The biographical side is fully dealt with in the lives of all the principal artists. The art museums are usually described under the titles of the cities in which they are situated; but a few are of sufficient importance to require separate articles. The principal schools of design are described in the general article upon that subject and in special articles on the more important schools. The description of celebrated representations in painting and sculpture is usually given in the biography of the artist who produced them. The article MYTHOLOGY IN ART gives a general treatment of such representations in Classic Art, which are further treated under the names of the subjects represented, as JUPITER, HERCULES, ACHILLES. The article ICONOGRAPHY similarly treats Christian Art, and there are special articles on a number of important themes of artistic treatment, such as CHRIST IN ART and MADONNA.

A. General Articles

I. INTRODUCTORY:

Art
Art, Primitive
Æsthetics

II. ORIENTAL ART:

Egyptian Art
Babylonian Art
Assyrian Art
Jewish Art
Phœnician Art
Mohammedan Art
Persian Art
Indian Art
Chinese Art
Japanese Art

III. European Development:
- Greek Art
- Etruria
- Roman Art
- Christian Art
- Byzantine Art
- Monastic Art
- Romanesque Art
- Lombard Art
- Gothic Art
- Renaissance Art

IV. Art Museums, Societies, and Schools:
- Design, Schools of
- École des Beaux-Arts
- National Academy of Design
- Society of American Artists
- Royal Academy of Arts
- Saint Luke, Academy of
- British Museum
- Louvre
- Luxembourg Palace
- Pitti Palace
- Uffizi

B. Architecture

In its widest sense, Architecture includes any kind of construction; but, in the *New International Encyclopædia*, the term is usually restricted to building which attains the dignity of art. Purely technical and utilitarian phases of architecture are treated under Building, Fireproof Construction, Masonry, and similar titles. (See the chapter on Manufactures and Engineering.) The three principal varieties of architecture are civil, religious, and military; and under these heads will be found their chief subdivisions. A few of these call for more detailed treatment of the component parts, and these are best enumerated below in connection with that style under which they were principally developed; as, for instance, Temple under Greek Architecture, Church under Early Christian, Monastery and Castle under Romanesque. Most celebrated works of architecture are treated in the articles on those cities in which they are situated; but a number of buildings of especial interest are treated separately, and in the following scheme of study, such buildings are enumerated under the different styles of architecture of which they are representative. For example, Parthenon, Erechtheum, etc., appear under Greek Architecture, Notre Dame de Paris and Westminster Abbey under Gothic.

I. Civil Architecture:
- Municipal Architecture
- Forum
- Palace
- Fountain
- Villa
- Mausoleum
- Theatre
- Amphitheatre
- Circus
- Bath
- Town Hall
- Arch, Triumphal
- Aqueduct
- Bridge

II. Religious Architecture:
- Temple

Church
Cathedral
Monastery
Oratory
Baptistery

III. Military Architecture:

Acropolis
Citadel
Castle
Camp
Fortification

IV. Technical Terms.

A large number of architectural terms deserve special treatment. Some of these, which are general in their application, are enumerated below, while others, the application of which is restricted to a particular style, are enumerated under that style; as, for example, Mosque under Mohammedan. See:

Arabesque
Arcade
Arch
Balcony
Balustrade
Bay Window
Belfry
Ceiling
Colonnade
Column
Cupola
Dome
Door
Doorway
Façade
Floor
Hall
Molding
Orders of Architecture
Ornament
Panel
Pendentive
Pilaster
Pillar
Porch
Portal
Roof
Spire
Tower
Tracery
Window

V. Historic Styles and Biography.

Architecture is the most ancient and, perhaps, the most important of the fine arts. In most artistic developments, both painting and sculpture have been subordinate to it. Its historical treatment, therefore, forms an extensive and important part of the general department of architecture in the Encyclopædia. A general historical sketch of its development, from the most ancient times to the present, is given in the article Architecture. This should be supplemented by the copious articles on the great historic styles, with the biographical additions given in the following list. Our treatment will outline the salient features of the different styles, beginning with those Oriental nations whose architecture lies remote from the European development—such as China, India, and Japan. We then proceed to those ancient nations, like Babylonia and Egypt, which materially influenced the Greek architecture. From Greek architecture, is descended the Roman, and from the Roman, the Mediæval and Renaissance styles, and finally the architecture of the present day.

1. *India.*

The architecture of India begins with the Buddhist style (b. c. 300-a. d.

700), whose buildings are of three classes: stupa or tope (a mound enclosing a relic); rock temples (chaityas); and monasteries (viharas). The Neo-Brahmanic style (beginning A. D. 700) comprises many varieties, including the so-called Jaina and Dravidian. It developed the architectural detail, the over-rich ornamentation, the pagodas and gopuras of the South. The Mohammedan architecture of India, differing materially from these styles, is best treated under MOHAMMEDAN ART. See:

Indian Art
Tope
Vihāra
Ellora
Vijayanagara
Boro Buddor
Elephanta
Mohammedan Art

2. *China and Japan.*

The most characteristic feature of Chinese architecture, which begins in the first century B. C., after the advent of Buddhism, is the tiled roof of tent-like form. Others are the pagoda, the pail-loo (a monumental gateway), and elaborately colored surface decoration. Japanese architecture, which begins with the seventh century A. D., is even less massive. It makes more of timber construction, and spends more upon roof effects than the Chinese. See:

Chinese Art
Japanese Art
Pagoda

3. *Babylonia and Assyria.*

The earliest dated architectural remains are those of the Babylonians, from as far back as B. C. 6000. Their building material was brick, and they were the first to construct vaults and arches. Their most important buildings were the temples, which were stepped pyramids of great height, brilliantly colored with glazed tiles. Their city walls were of amazing height and thickness.

Assyrian architecture was derived from the Babylonian, but was more secular in character, the chief buildings being the royal palaces, in which it perfected decorative relief sculpture of a high order. See:

(*a*) Babylonian Art
Babylon
Babel, Tower of
Nippur
Erech
Ur
(*b*) Assyrian Art
Nineveh
Nimrud
Khorsabad
Koyunjik

4. *Persia, Phœnicia, Judea.*

The Babylonian-Assyrian influence was determinative for the architecture of the Hittites, and for the utilitarian art of the Phœnicians, who built for Solomon the Temple at Jerusalem. Ancient Persian architecture shows a mingling of Babylonian with Egyptian and Greek influences; but, under the Parthian and Sassanian dynasties, it reverted to purer Oriental types. See:

Hittites
Phœnician Art
Jewish Art
Temple at Jerusalem
Persian Art
Ecbatana
Susa

Pasargadæ
Firuzabad

5. *Egypt.*

The architectural monuments of the Old Empire (B. C. 4500-2160) are chiefly sepulchral—pyramids, mastabas, and tomb-temples. Temple architecture took on a new development with the Middle Empire (B. C. 2160-1788), and attained its highest development under the New Empire (B. C. 1588-1150), which followed the disastrous interruption of the Hyksos invasion. After a long decline, there was a brilliant revival under the Ptolemies in the third century B. C. The temples were often, like the Ramesseum, sepulchral; some were rock-cut, as at Abu-Simbel; some partly hewn and partly constructed, as at Deir-el-Bahri. The greatest temples are those of Karnak, Luxor, Medinet-Habu, Abydos, the Ramesseum, and the Ptolemæe and Roman temples of Denderah, Philæ, and Edfu. For descriptions, consult the section *Architecture*, under EGYPTIAN ART. See:

Egyptian Art
Pyramid
Mastaba
Mêdûm
Luxor
Thebes
Karnak
Edfu
Elephantine
Abu-Simbel
Deir-el-Bahri
Ramesseum
Medînet Habu
Denderah
Philæ
Beni-Hassan

6. *Greece.*

The Mycenæan architecture in Greek lands, sometimes known as the Ægean style, is described under ARCHÆOLOGY, and in the articles on the principal sites of this culture. From the main hall of the Mycenæan palace was evolved that marvelous structural masterpiece, the Greek Temple, the final type of which appears in the seventh century B. C. For a description of this temple, which is the central figure of Greek architecture, consult GREEK ART. The origin and development of the two principal styles of temple architecture, Doric and Ionic, are treated under ARCHITECTURE and ARCHÆOLOGY. The earliest examples of the Doric are in Sicily and Southern Italy, and it attained perfection during the fifth century, in buildings like the Parthenon and Theseum at Athens, and in the temples of Pæstum. The Ionic order was increasingly used in the fourth century B. C., as at Miletus and Ephesus, the Corinthian being as yet used for small monuments only. The Hellenistic age saw a great development of architecture of a private, civil, and sepulchral character, like the stoa, propylæa, theatre, odeon, and mausoleum.

(*a*) General Titles:

Cyclopean Architecture
Archæology
Greek Art
Temple
Doric Order
Ionic Order
Corinthian Order
Column
Fluting
Entablature
Base

Pediment
Frieze
Cornice
Acanthus
Pæstum
Agrigentum
Selinus
Segesta
Parthenon
Theseum
Erectheum
Phigalia
Miletus
Diana, Temple of
Teos
Magnesia

(*b*) Civil Architecture:

Propylæa
Stoa
Colonnade
Stadium
Theatre
Mausoleum
Choragic Monument

(*c*) Biography:

Ictinus
Callicrates
Mnesicles

7. *Rome.*

For a general view of Roman architecture, the student is referred to ROMAN ART. The early architecture of Rome is practically Etruscan, and to this people the Romans owe their knowledge of vaulting and the arch. At the close of the republican epoch, they adopted Greek orders, evincing special preference for the Corinthian, which they developed into an independent order, and from which they evolved the so-called composite. These forms were decoratively used as adjuncts of construction. The principal works of Roman architecture were great civil structures, like the fora, triumphal arches, amphitheatres, thermæ, aqueducts, besides many superb temples. The highest development was during the first 150 years of the empire, after which came the decline. See:

(*a*) Etruria (section on Art)
Cloaca
Roman Art
Aqueduct
Tabularium
Forum
Trajan, Forum of
Basilica
Pantheon
Theatre
Amphitheatre
Arch, Triumphal
Trajan, Arch of
Titus, Arch of
Constantine, Arch of
Septimius Severus, Arch of
Antonine Column
Caracalla, Baths of
Diocletian, Baths of
Tivoli
Pompeii
Herculaneum
Baalbek
Palmyra

(*b*) Biography:

Apollodorus

8. *Early Christian.*

Early Christian architecture is an adaptation of the declining Roman to the needs of Christian worship. The requirement was a large interior for many worshipers, resulting in the development of the basilical construction, which became typical for church build-

ing. The component parts of the basilica are discussed in the articles listed below under Basilical Construction. The article CHURCH gives the general development of the church building. To this is added a list of other terms of ecclesiastical architecture.

(*a*) Basilical Construction:
- Basilica
- Apse
- Transept
- Atrium
- Nave
- Altar
- Choir
- Confessional

(*b*) Church, etc.:
- Church
- Catacombs
- Chancel
- Chapel
- Crypt
- Font
- Reredos
- Sacristy

9. *Byzantine.*

In the eastern half of the Roman Empire, the Byzantines developed the domical construction, inventing the pendentives to support the dome. Byzantine architecture was also characterized by rich mosaic decoration. Its great masterpieces are the Church of Saint Sophia at Constantinople and Saint Mark's at Venice. It prevailed throughout the Eastern Empire until its destruction by the Turks; in Southern Italy, Sicily, Venice, and Ravenna; in Armenia, the Balkans, and wherever else the Greek Church prevailed. Russian architecture is a development of the Byzantine. See:

- Byzantine Art
- Mosaic
- Dome
- Pendentive
- Saint Sophia
- Saint Mark's Church
- Anthemius (of Tralles)

10. *Mohammedan.*

Coincident with the Mohammedan conquests, a style of architecture arose based upon the Byzantine and Persian. Its golden age began with the tenth century, and the final types were attained in the eleventh. The ultimate type of the mosque was built on the court-plan, with pointed arches, highly colored geometrical ornament, and dome vaulting. The principal schools were the Moorish (Spain), Egyptian, Turkish, Persian, and the Mohammedan styles that grew up in India. All these are described in MOHAMMEDAN ART, besides which there are articles upon the most prominent features of Mohammedan architecture. See:

- Mohammedan Art
- Mosque
- Minaret
- Tekiyé
- Bazar
- Caravanserai
- Alhambra
- Taj Mahal

11. *Romanesque* (A. D. 800-1200).

In Middle and Western Europe, Early Christian architecture was succeeded by the Romanesque, which was pre-eminently the art of the monastic orders and of feudalism. Among its innovations were the cruciform plan, the developed crypt, and the incorporation of bell-towers with the church building. But the principal achieve-

ment of Romanesque architecture was the perfection of vaulting,—the dome and tunnel vault in Southern France, and the groined vault in Lombardy, the Rhinelands, Normandy, and England. It thus led the way to the development of the pointed arch and Gothic architecture. The basis of the study of Romanesque architecture should be the appropriate section of ROMANESQUE ART. See:

Romanesque Art
Lombard Art
Norman Architecture
Vault
Crypt
Bell-Tower
Castle
Keep
Bailey
Tower
Bastion
Barbican
Wartburg
Monastery
Cloister
Chapter-house
Dormitory

12. *Gothic.*

Gothic architecture is the development of Romanesque groined vaulting. By means of the pointed arch, the most characteristic feature of the system, the vertical strains are concentrated in powerful piers, the horizontal thrusts on flying buttresses, permitting light walls, huge windows and an infinite wealth of statuary and tracery. Gothic architecture originated in France in the twelfth century, and there it also attained its most perfect development in the thirteenth, declining into the Flamboyant style of the fifteenth century. Spanish Gothic of the thirteenth century is second only to the French, though later debased by too much ornament. In England, a peculiarly national style arose, which should be studied under the headings by which three varieties are usually known, EARLY ENGLISH, DECORATED, and PERPENDICULAR. At its best, the German Gothic is noted for its beautiful tracery and spires. In Italy, the Gothic style is purely decorative, and it produced a charming style of civic buildings, especially in Tuscany and Venice. The basis of study should be the article, GOTHIC ARCHITECTURE, supplemented by the articles on special churches, and the descriptions in the articles on the cities, a few of which are appended. See:

(*a*) Gothic Architecture
Vault
Flamboyant
Early English
Decorated Style
Perpendicular
Fan-Tracery Vaulting
Notre Dame de Paris
Sainte Chapelle
Westminster Abbey
Santa Croce

(*b*) Cathedral Cities:
Rheims
Amiens
Burgos
Lincoln
Salisbury
York
Canterbury
Winchester
Cologne
Strassburg
Nuremburg

Freiburg
Milan
Florence
Siena
Orvieto

(*c*) Biography:

Montreuil, Pierre de
William of Wykeham
Erwin
Arnolfo di Cambio

13. *Renaissance.*

(*a*) Italy.

Renaissance architecture is the adaptation of classical forms, as they survived in Roman remains, to the architectural needs of the day. The Early Renaissance (fifteenth century) originated in the works of Brunelleschi at Florence, whence it was introduced into the rest of Italy. Its work was decorative in character, the constructive side being rather developed by the Roman school, headed by Bramante. The tendency was increasingly towards the formal classicism evinced in the works of Palladio and Vignola. As a reaction, came the freer but exaggerated Barocco of the seventeenth and eighteenth centuries. The basis of study should be the section *Architecture,* under RENAISSANCE ART.

(i) Prominent Buildings:

Certosa
Doge's Palace
Pitti Palace
Lante, Villa
Villa, Giulia
Saint Peter's Church

(ii) Biography:

Brunelleschi, Filippo
Michelozzi, Michelozzo
Alberti, Leone Battista
Giuliano da Majano
Laurana, Luciano da
Sangallo
Bramante, Donato d'Agnolo
Peruzzi, Baldassare
Sansovino, Jacopo
Michelangelo
Vignola, Giacomo Barozzo da
Palladio, Andrea
Serlio, Sebastiano
Scamozzi, Vincenzo
Fontana, Domenico
Maderna, Carlo
Bernini, Giovanni Lorenzo
Borromini, Francesco
Ammanati, Bartolommeo
Longhena, Baldassare

(*b*) Other Countries.

Outside of Italy, the most important development of Renaissance architecture was the French. Its most original type was the mediæval castle transformed into the palace of the Renaissance. There was constant influence from Italy, but the later French Barocco is superior to the Italian. In Germany, the Gothic elements survived late, and materially influenced the incoming Renaissance. A similar development occurred in other European countries. Spain made use of much elaborate decorative detail. The Renaissance appeared latest of all in England in the seventeenth century. A kind of Palladian High Renaissance, adopted by Inigo Jones, and developed by Wren, retained a purifying influence during the eighteenth century, until the advent of classic revival.

(i) France:

Palace
Chambiges, Martin

Bullant, Jean
De l'Orme, Philibert
Lescot, Pierre
Brosse, Salomon de
Mansart
Fontainebleau
Louvre
Tuileries
Luxembourg Palace

(ii) Great Britain:

Jones, Inigo
Wren, Sir Christopher
Van Brugh, Sir John
Hawksmoor, Nicholas
Chambers, Sir William
Nash, Sir John
Dance, George
Saint Paul's Cathedral
Whitehall

14. *Nineteenth Century.*

The reaction against the exaggerated styles of the eighteenth century was an imitation of classical forms. In France, Roman forms were predominant in the great structures of the Republic and first Empire; but, in England and Germany, Greek forms were more closely followed. About 1830 came the Gothic revival, which attained especial development in England, in such buildings as the Houses of Parliament and numberless churches. The present tendency is towards Renaissance forms and greater freedom from tradition.

The tasteful colonial architecture of the United States followed English models, but the early republic adopted the classic revival (Capitol). The period of the Civil War (till 1870) was singularly unfruitful; but between 1870 and 1880 there was a revival of the artistic spirit. The problem of the artistic treatment of the skyscraper with the steel-frame construction is as yet unsolved; but constant improvement is being made. The basis of study should be the section on the *Nineteenth Century.*

(*a*) France:

Soufflot, Jacques Germain
Percier, Charles
Fontaine, P. F. L.
Viollet-le-Duc
Visconti, L. T. J.
Garnier, J. L. C.

(*b*) Germany and Austria:

Gartner, Friedrich von
Schinkel, Karl Friedrich
Klenze, Leo von
Hansen, Theophilus von
Semper, Gottfried

(*c*) Great Britain:

Soane, Sir John
Smirke, Sir Robert
Pugin, Augustus
Pugin, Augustus N. M.
Wyatt, Sir Matthew D.
Fergusson, James
Scott, Sir George Gilbert
Street, George Edmund
Barry, Sir Charles
Waterhouse, Alfred
Paxton, Sir Joseph
Parliament, Houses of

(*d*) United States:

Latrobe, Benjamin Henry
Bulfinch, Charles
Walter, Thomas Ustick
Renwick, James
Upjohn, Richard
Hunt, Richard Morris
Richardson, H. H.
McKim, Charles F.

Chapter 11. The Fine Arts
(Sculpture and Painting)

(Read general introduction at the opening of preceding chapter.)

A. Sculpture

The study of sculpture centres about the general article on that subject. In this article will be found sections on the technical processes and materials, especially the modern, and on the different forms of sculpture, and a sketch of the history of sculpture, containing a description of the characteristics and the development of the different schools, as revealed in their principal artists. The study of the technical forms and processes of sculpture should be supplemented by the special articles enumerated below, which also contain historical sketches of these subjects; that of the history by those on the different schools and epochs of art, and above all by the biographies of the artists, some of which are enumerated below.

I. Branches and Technique of Sculpture.

Carving
Chasing
Founding
Relief Sculpture
Equestrian Statue
Bronze
Chryselephantine
Goldsmith's Work
Terra Cotta
Ivory
Metal Work
Wood-carving
Stucco

II. Greek and Roman Sculpture.

The sculpture of Oriental countries is decorative in character, and therefore best considered in connection with their architecture, under the titles of the division Oriental Art, enumerated in Chapter 9, Section A. Among the Greeks, sculpture first attained the dignity of an independent art, and achieved the highest ideal perfection in the world's history. The study of the separate epochs of Greek sculpture should be based upon the articles Archæology and Greek Art. Its rude beginnings date from the seventh century B. C., and by the end of the archaic period (B. C. 480) the emancipation was well advanced. The Attic period (480-323), during which the chief art centre was at Athens, witnessed the highest development of Greek art. It is ushered in by a period of transition (till about 450), in which great progress was made towards mastery of technique. The last half of the fifth century, the age of Phidias, begins the golden period of Greek art. The greatest technical knowledge was subordinated to idealism and self-restraint, and to the utmost nobility of conception. The golden age continued during the epoch of Praxiteles and Scopas, which, though still ideal, was more realistic and interested in individual traits and features. It succeeded especially well in portraiture, and attained the highest mastery of technique. During the Hellenistic age (323-146), the centres of art passed from Greece to Asia and Egypt, to

Pergamus, Rhodes, and Alexandria. Art came more into the service of individuals, and, notwithstanding the highest technical skill, it often sought sensational or trivial subjects. Roman sculpture is, for the most part, copied from the Greek, and shows little originality except in a fine realistic rendition of portraiture, and in pictorial relief-sculpture. See:

1. *The Archaic Period:*
   - Archæology
   - Greek Art
   - Antenor

2. *The Attic Period:*
   - Æginetan Sculptures
   - Calamis
   - Pythagoras of Rhegium
   - Myron
   - Discobolus
   - Phidias
   - Elgin Marbles
   - Polyclitus
   - Agoracritus
   - Cresilas
   - Pæonius
   - Cephisodotus
   - Praxiteles
   - Demetrius
   - Scopas
   - Mausoleum
   - Marsyas

3. *The Hellenistic Period:*
   - Lysippus
   - Pergamon
   - Zeus Atricoli
   - Apollo Belvidere
   - Venus of Milo
   - Laocoön

4. *The Roman Sculpture:*
   - Section *Sculpture* under Roman Art
   - Venus of Medici

III. Mediæval Sculpture.

The decorative sculpture of the Middle Ages can best be studied in connection with the architecture of the period, under the titles of the mediæval epochs enumerated in Chapter 9, Section A. The history of modern sculpture begins with the Italian revival of the thirteenth century. Nicola Pisano found his models in the antique, but his son Giovanni reverted to the Gothic, and his naturalistic, dramatic style prevailed in Italy. The Pisan School was the mother of those of Florence and Siena. The former was superior in technique and composition, the latter was rather picturesque and narrative in character. During the entire Middle Ages, and to some extent during the Renaissance, the usages of Church worship furnished abundant opportunity for the sculptor's art. See:

1. *First Revival in Italy* (under Sculpture)
   - Christian Art
   - Byzantine Art
   - Romanesque Art
   - Gothic Art
   - Antelami, Bendetto
   - Pisano, Nicola
   - Pisano, Giovanni
   - Pisano, Andrea
   - Arnolfo di Cambio
   - Andrea di Ugolino
   - Orcagna, Andrea

2. *Ecclesiastical Sculpture:*
   - Altar
   - Pulpit
   - Ambo
   - Cross
   - Crucifix
   - Reliquary

Chalice
Tomb

IV. The Renaissance.

The sources of inspiration during the Renaissance were the study of nature and of the antique, as it survived in ancient statues. The chief characteristic of the Early Renaissance is a healthy naturalism. It attained a high perfection, in relief as in statuary, and excelled equally in bronze, marble, and terra cotta. The centre of the art was Florence, and the dominant figure during the fifteenth century, amid a brilliant array of artists, was Donatello. The school of Siena was more sentimental in feeling and elaborate in decoration; those of Lombardy and Venice were luxuriant in decoration, the former being more vigorous in form. The High Renaissance is characterized by a deeper knowledge and greater influence of the antique and by a more universal style, notably in works of its greatest master, Michelangelo; but these qualities afterward degenerated into a mannered imitation, and later into the extravagances of the Baroque.

The sculpture of France in the fifteenth century was at first influenced by that of Flanders, but the native style soon became transformed by Italian grace and beauty. Even the Baroque of the seventeenth century here exhibits a certain classical restraint. During the eighteenth exaggerated form gave place to the more delicate and decorative treatment of the Rococo, which excelled especially in statuettes. A fine, healthy realism ultimately prevailed. In Germany, Gothic forms lingered throughout the fifteenth century, and when, during the sixteenth, the Italian influence arrived, it was less important than in other countries and confined to the South. A native naturalistic art dominated the Netherlands during the fifteenth century, but, in the seventeenth, the Italian Baroque entered, and, in the eighteenth, sculpture declined. A similar development occurred in Spain, where wood sculpture found great employment in altars, retables, reredoses. Its apogee was a realistic reaction in the seventeenth century, with centre at Seville. See Section *The Renaissance*, under Sculpture.

1. *Italy:*

(*a*) Florence:

Ghiberti, Lorenzo
Donatello
Michelozzi
Robbia, Luca della
Verrocchio, Andrea del
Pollaiuolo, Antonio
Desiderio da Settignano
Rossellini
Benedetto da Maiano
Mino da Fiesole
Civitale, Matteo
Sansovino, Andrea
Michelangelo
Cellini, Benvenuto
Boulogne, Jean

(*b*) Other Cities:

Quercia, Jacopo della
Mazzoni, Guido
Solari, Cristoforo
Lombardi, Pietro
Leopardi, Alessandro
Sansovino, Jacopo
Leoni, Leone
Bernini, Giovanni Lorenzo
Algardi, Alessandro

2. *France:*

Colombe, Michel
Goujon, Jean
Pilon, Germain
Puget, Pierre
Coyzevox, Antoine
Girardon, François
Pajou, Augustin
Pigalle, Jean Baptiste
Falconnet, Etienne
Michel, Claude (Clodion)
Houdon, Jean Antoine

3. *Germany:*

Wohlgemuth, Michel
Stoss, Veit
Krafft, Adam
Vischer, Peter
Riemenschneider, Tilman
Syrlin, Jörz
Schlüter, Andreas
Donner, Raphael

4. *Other European Countries:*

Sluter, Claux
Duquesnoy, François
Quellinus, Artus
Berruguete, Alfonso
Montañes, Martinez
Cano, Alonzo
Gibbons, Grinling

V. Modern Sculpture.

The reaction upon the extravagances of Baroque sculpture, at the close of the eighteenth century, took the form of a return to classic simplicity, and the antique was imitated more closely than ever before. In France, this classicism was followed by a Romantic tendency, corresponding to a similar movement in painting, and by a more important naturalistic reaction. In the second half of the nineteenth century, classicism and naturalism ran parallel, with an increasing influence of the latter, which now prevails. England had a similar classical period, and a subsequent transition to naturalism; but since 1870 a great change, both in conception and treatment, has come over English sculpture chiefly through the effort of great English painters and the French influence. The German reaction against classicism resulted in the historical school of Berlin, whose work tended toward naturalism, and in the romantic school of Munich; not until the end of the nineteenth century did naturalism prevail. In other European countries the development has been similar to that general evolution described above. After some ineffectual early attempts, America also had its classical school, with a number of important artists. Since the last quarter of the nineteenth century the tendency has been entirely naturalistic, and an array of talent has appeared which compares favorably with that of other countries. See:

1. *France:*

Pradier, James
David d'Angers
Rude, François
Barye, Antoine Louis
Chapu, Henri Michel
Dubois, Paul
Mercié, Antonin
Barrias, Ernest
Bartholdi, Frédéric
Carpeaux, Jean Baptiste
Frémiet, Emmanuel
Dalou, Jules
Rodin, Auguste
Bartholomé, Paul Albert

2. *England:*

Flaxman, John
Westmacott, Richard
Gibson, John
Stevens, Alfred
Foley, John Henry
Woolner, Thomas
Watts, George Frederick
Thornycroft, Hamo
Brock, Sir Thomas
Ford, Edward Onslow
Gilbert, Alfred
Frampton, Sir George
Epstein, Jacob

3. *Germany:*

Dannecker, Johann Heinrich
Schadow, Johann Gottfried
Rauch, Christian
Hähnel, Ernst
Rietschel, Ernst
Schilling, Johannes
Schwanthaler, Ludwig
Begas, Reinhold
Stuck, Franz
Klinger, Max
Zumbusch, Kaspar
Tilgner, Viktor
Strasser, Arthur
Tuaillon, Louis

4. *Other European Countries:*

Canova, Antonio
Thorvaldsen, Bertel
Tenerani, Pietro
Marchesi, Pompeo
Dupré, Giovanni
Ximenes, Ettore
Sergel, Johan Tobias
Sinding, Stefan
Antokolski, Mark
Troubetzkoi, Prince Paul

5. *United States:*

(*a*) Classicists:

Greenough, Horatio
Powers, Hiram
Crawford, Thomas
Story, William Wetmore
Rogers, Randolph
Rogers, John
Rinehart, William Henry
Hosmer, Harriet

(*b*) Early Naturalists:

Palmer, Erastus Dow
Mills, Clark
Ball, Thomas
Brown, Henry Kirke
Ward, J. Q. A.
Keyser, Ephraim

(*c*) Naturalism Under French Influence:

Warner, Olin Levi
Saint Gaudens, Augustus
French, Daniel Chester
Macmonnies, Frederick
Bitter, Karl
Niehaus, Charles Henry
Partridge, William Ordway
Dallin, Cyrus Edwin
Proctor, A. Phimister
Kemeys, Edward
Bartlett, Paul
Barnard, George Grey
Borglum, Gutzon
Borglum, Solon H.
Platt, Bela Lyon
Grafly, Charles
Calder, Alexander S.
Taft, Lorado
Tilden, Douglas
Aitkin, Robert I.
Vonnoh, Bessie Potter

B. Painting

A series of special articles treats the technical side of painting, the different varieties, the painter's implements, and the qualities by which a picture should be judged. The history of the different schools is comprehensively described under PAINTING. This article should form the basis of the study of any given school; it should, however, be supplemented by the articles on separate schools and the biographies of the artists, of which only the principal are contained in the following lists.

I. TECHNIQUE AND ALLIED ARTS.

1. *Varieties:*
   - Mural Decoration
   - Genre Painting
   - Portraiture
   - Landscape
   - Still Life

2. *Technical Processes:*
   - Fresco
   - Tempera
   - Oil Painting
   - Pastel
   - Water-Color Painting
   - Encaustic Painting
   - Stereochromy

3. *Implements:*
   - Canvas
   - Easel
   - Mahlstick
   - Ground
   - Painters' Colors

4. *Technical Qualities:*
   - Drawing
   - Line
   - Perspective
   - Chiaroscuro
   - Color
   - Composition
   - Proportion

5. *Analogous Arts:*
   - Mosaic
   - Stained Glass
   - Decorative Art
   - Sgraffito

II. GREEK PAINTING.

The decorative painting of Oriental countries is treated under the different titles of the subdivision Oriental Art, in the introductory section of the preceding chapter. Greek painting was the first to rise to the dignity of an independent art. The transition from the painting of Cretan and Mycenæan decorations, which show considerable technical skill and a high power of invention, to that of the fifth century B. C. can be studied only in vase-painting (see VASE). In the fifth and fourth centuries B. C., Greek painting attained its highest development. The older Attic School, with Polygnotus as its founder and Athens as a centre, brought the art to a high state of development in the years following the Persian wars. Its decorative work was practically great, colored, outline drawings, noble in composition and expression. Perspective and shading were discovered by Agatharchus of Samos, a scene painter, and applied to panel-painting by Apollodorus of Athens. In the later fifth century flourished the Ionian School of Zeuxis and Parrhasius, which substituted realism for the old idealism and excelled in delicate drawing and chiaroscuro.

In the early fourth century, the centre of painting shifted to Sicyon, where systematic drawing and chiaroscuro were further developed, and the process of encaustic painting was invented. The Theban-Attic School (second half of the fourth century) was devoted to impassioned subjects, like battle pieces, and even to genre, and the highest technical perfection was achieved by the younger Ionian School in the persons of Apelles and Protogenes. In the Hellenistic age painting increased the range of its expression, including even the landscape, but it declined in artistic quality. The decorative and less important painting of the Roman epoch is treated under ROMAN ART. See:

1. *General References:*

Section *Painting* under Greek Art and Roman Art
Vase

2. *Greek Painters:*

Polygnotus
Micon
Agatharchus
Apollodorus
Zeuxis
Parrhasius
Pamphilus
Pausias
Apelles
Protogenes
Aldobrandini Marriage

III. MEDIEVAL PERIOD.

The origins of Mediæval painting were conditioned by the Mosaic style, as it prevailed in Early Christian and Byzantine art. Its growth was dependent upon the development of architecture in Church worship, and it consequently remained decorative. At the close of the Gothic period, the emancipation of painting began in Italy, and individual artists arose. The chief centres were Florence, where Giotto founded a powerful school of mural painting, and Siena, which developed panel painting under strong Byzantine influence. See:

Mosaic
Christian Art
Byzantine Art
Romanesque Art
Gothic Art
Florentine School of Painting
Sienese School of Painting
Cavallini, Pietro
Cimabue
Giotto
Gaddi, Taddeo
Orcagna, Andrea
Aretino, Spinello
Duccio di Boninsegna
Martini, Simone
Lorenzetti
Gentile da Fabriano
Lorenzo, Don

IV. THE RENAISSANCE.

Naturalism dominated the painting of the Early Renaissance in Italy, the classic influence appearing only in the decorative motifs. Our study begins with Florence, where the great technical problems were solved for future painting. The High Renaissance combined the achievements of the Early with a profounder knowledge of the Antique. The Florentine school ranked highest in everything but color, in which the Venetians excelled, as did the Umbrians in religious sentiment. In Northern Europe the Renaissance, entirely naturalistic in character, but

Gothic in sentiment, first appeared in Flanders, whence its influence extended to Holland and Germany. Later the Italian influence transformed for the worse the art of the Netherlands, but aided to produce a national school in Germany. See:

1. *Italy.*

(*a*) General Titles:

Renaissance Art
Section *The Renaissance* under Painting
Florentine School of Painting
Umbrian School of Painting
Bolognese School of Painting
Ferrarese School of Painting
Venetian School of Painting

(*b*) Biography:

(i) Florence:

Masolino da Panicale
Angelico, Fra
Masaccio
Uccello, Paolo
Castagno, Andrea del
Lippi, Filippo and Filippino
Botticelli, Sandro
Gozzoli, Benozzo
Pollaiuolo, Antonio
Verrocchio, Andrea
Ghirlandaio, Domenico
Vinci, Leonardo da
Michelangelo
Bartolommeo, Fra
Sarto, Andrea del
Bronzino, Agnolo

(ii) Umbria:

Francesca, Piero della
Melozzo da Forlì
Santi, Giovanni
Signorelli, Luca
Perugino, Pietro
Pinturicchio
Raphael

(iii) Northern Italy:

Squarcione, Francesco
Mantegna, Andrea
Tura, Cosimo
Costa, Lorenzo
Francia, Francesco
Viti, Timoteo
Dosso Dossi
Garofalo
Correggio
Sodoma
Pisanello
Foppa, Vicenzo
Borgognone
Predis, Ambrogio da
Solario, Andrea
Luini, Bernardino
Ferrari, Gaudenzio

(iv) Venice:

Vivarini
Crivelli, Carlo
Antonello da Messina
Bellini (family)
Carpaccio, Vittore
Giorgione
Titian
Bonifazio Veronese
Lotto, Lorenzo
Tintoretto
Veronese, Paolo
Bassano
Moretto da Brescia
Moroni, Giambattista

(v) Rome:

Sebastiano del Piombo
Volterra, Daniele da
Pippi, Giulio (called Romano)

2. *The Netherlands:*

Netherlands Schools of Painting
Eyck, Huybrecht and Jan van
Weyden, Rogier van der
Bouts, Dierick

Hugo van der Goes
Memling, Hans
David, Gerard
Matsys, Quinten
Orley, Bernaert van
Mabuse, Jan
Lucas van Leyden
Bosch, Hieronymus

3. *Germany:*

Lochner, Stephan
Schongauer, Martin
Wohlgemuth, Michel
Dürer, Albrecht
Burckmair, Hans
Cranach, Lucas
Holbein the Elder
Holbein the Younger
Grünewald, Matthias
Baldung, Hans

4. *France and Spain:*

Fouquet, Jehan
Clouet
Cousin, Jean
Coello, Alonzo
Morales
Theotocopuli (called El Greco)

V. Seventeenth and Eighteenth Centuries.

The seventeenth century saw the rise of the Eclectic and Naturalist schools in Italy, and of a courtly art, based upon the classic, in France, whose art ists in Italy also perfected the classic landscape. It was the golden age of painting in Spain, Flanders and Holland. Spain developed a great religious art, combining Catholic devotion with a trenchant realism, and a marvelous portraitist in Velazquez. The Flemish School was also realistic, but more influenced by Italy, and less religious in character. In Holland, a highly developed national realism, practically uninfluenced from without, found expression in panels of portrait, genre, landscape, animal, and still life. The eighteenth century witnessed in France the light, graceful and decorative painting of the Rococo, and the rise in England of a bourgeoise art, showing a curious admixture of Eclectic Italian influence with realism, and foreshadowing that of the nineteenth century. See Section *Seventeenth and Eighteenth Centuries* in the article on Painting.

1. *Italy:*

Bolognese School of Painting
Carracci
Domenichino
Reni, Guido
Guercino
Dolci, Carlo
Caravaggio
Rosa, Salvator
Giordano, Luca
Tiepolo
Canaletto
Guardi, Francesco
Carriera, Rosalba

2. *France:*

Poussin, Nicolas
Gelée, Claude (Claude Lorrain)
Lebrun, Charles
Mignard, Pierre
Champagne, Philippe de
Watteau, Antoine
Fragonard, Jean Honoré
Chardin, Jean Siméon
Lancret, Nicolas
Boucher, François
La Jour, Maurice
Quentin
Greuze, Jean Baptiste
Vigée-Lebrun

3. *Spain:*
   Herrera the Elder
   Ribera, Jusepe
   Velazquez
   Zurbaran
   Cano, Alonzo
   Coello, Claudio
   Murillo
   Goya y Lucientes

4. *Flanders:*
   Rubens, Peter Paul
   Van Dyck, Anthonis
   Jordaens, Jacob
   Snyders, Frans
   Fyt, Jan
   Teniers the Younger
   Brouwer, Adriaen

5. *Holland:*
   (*a*) Portraiture (q. v.):
   Mierevelt, Michiel
   Hals, Frans
   Rembrandt
   Maes, Nicolas
   Helst, Bartholomeus van der
   (*b*) Genre (q. v.):
   Ostade, Adriaen van
   Dou, Gerard
   Steen, Jan
   Terborch, Gerard
   Metzu, Gabriael
   Hooch, Pieter de
   Vermeer van Delft
   (*c*) Landscape (q. v.), etc.:
   Goyen, Jan van
   Ruysdael, Salomon
   Neer, Aert van der
   Ruisdael, Jacob
   Hobbema, Meindert
   Potter, Paulus
   Velde, Adriaen van de
   Cuyp, Albert
   Backhuysen, Ludolf
   Velde, Willem van de, the Younger
   Heem, Jan de
   Huysum, Jan van
   Beyeren, Abraham van
   David, Gerard
   Weenix, Jan
   Hondecoeter, Melchior

6. *England:*
   Lely, Sir Peter
   Kneller, Sir Godfrey
   Hogarth, William
   Reynolds, Joshua
   Gainsborough, Thomas
   Romney, George
   Wilson, Richard
   Morland, George

VI. Modern Painting.

1. *France.*

During the nineteenth century the hegemony of Europe in the fine arts belonged to France. Rococo art was succeeded in the last part of the eighteenth century by Classicism, which found the chief beauty of painting in form, as revealed in ancient sculpture. The reaction upon Classicism was Romanticism (from c. 1830), which used painting as an expression of the artist's emotional nature, and placed the chief emphasis upon color and natural truth. The Barbizon School represents the emotional impulse of Romanticism, as applied to landscape, animal painting, and peasant subjects. The third great factor in French painting is Realism, advocating the abolition of academic law and sentiment, and the exact presentation of natural truth. Then came Impressionism (1874), so called from a tendency to render momentary impressions, but which sought,

above all, to paint evanescent effects of light. Post Impressionism is a reaction on both Impressionism and Realism, which endeavors to paint pure feeling in purely abstract form and color. See:

(*a*) Classicists:

David, Jacques Louis
Prudhon, Pierre
Gros, Antoine Jean
Ingres, Jean Auguste Dominique

(*b*) Romanticists:

Géricault, Jean Louis
Delacroix, Eugène
Décamps, Alexandre Gabriel
Fromentin, Eugène
Vernet, Horace
Couture, Thomas
Regnault, Henri

(*c*) Eclectics:

Delaroche, Paul
Bouguereau, Guillaume Adolphe
Scheffer, Ary

(*d*) Barbizon Painters:

Corot, Camille
Rousseau, Théodore
Dupré, Jules
Díaz de la Peña
Daubigny, Charles François
Millet, Jean François
Troyon, Constant
Jacques, Charles
Cazin, Jean Charles

(*e*) Realists:

Courbet, Gustave
Bonnat, Léon
Duran, Carolus
Fantin-Latour
Meissonier, Ernest
Neuville, Alphonse Marie de
Détaille, Edouard

(*f*) Impressionists, etc.:

Impressionist Painting
Manet, Edouard
Renoir, August
Degas, Hilaire Germain
Raffaelli, Jean François
Monet, Claude
Pissaro, Camille
Sisley, Alfred
Besnard, Paul Albert

(*g*) Post Impressionists:

Post Impressionism
Cézanne, Paul
Gauguin, Paul
Matisse, Henri
Picasso, Pablo
Picabia, Francis

(*h*) Various Tendencies:

Flandrin, Jean Hippolyte
Puvis de Chavannes
Moreau, Gustave
Gérôme, Jean Léon
Vollon, Antoine
Bonheur, Rosa
Bastien-Lepage
Dagnan-Bouveret
Lhermitte, Léon

2. *Germany* (*including Austria*).

In Germany the reaction against Classicism first took the form of an imitation of Italian masters of the fifteenth century (Nazarenes). Extensive demand for mural decoration at Munich produced the so-called cartoon (q. v.) style, in which color was neglected. The Düsseldorf School represented the romantic tendencies of German art, chiefly in panel-painting. About 1850 a great change was effected by French and Belgian colorists; since 1870 Realism and since 1880 Impressionism have found entrance. The

most recent tendencies have been very radical (see SECESSION) and decorative in character, especially in Vienna. See:

Pre-Raphaelites
Düsseldorf School of Painting
Mengs, Raphael
Kauffmann, Angelica
Overbeck, Johann Friedrich
Cornelius, Peter von
Kaulbach, Wilhelm von
Rethel, Alfred
Schwind, Moritz von
Feuerbach, Anselm
Makart, Hans
Max, Gabriel
Munkácsy, Michael
Knaus, Ludwig
Defregger, Franz von
Grützner, Eduard
Menzel, Adolf
Lenbach, Franz
Leibl, Wilhelm
Bocklin, Arnold
Liebermann, Max
Klinger, Max
Thoma, Hans
Uhde, Fritz von
Gebhard, Eduard
Kampf, Arthur
Zügel, Heinrich
Stuck, Franz

3. *Great Britain.*

The chief aim of British art during the early nineteenth century was historical pictures of an academic order. Landscape painting culminated in Turner and Constable. A reaction against the academic came about through the Pre-Raphaelites (q. v.), who introduced spiritual and realistic elements. The chief influence in recent years has been French. See:

Raeburn, Sir Henry
Lawrence, Sir Thomas
Hoppner, John
Haydon, Benjamin Robert
Eastlake, Sir Charles
Blake, William
Wilkie, David
Turner, J. M. W.
Crome, John
Constable, John
Rossetti, Dante Gabriel
Hunt, William Holman
Burne-Jones, Sir Edward
Millais, Sir John Everett
Watts, George Frederick
Herkomer, Hubert
Leighton, Frederick, Lord
Alma-Tadema, Lawrence
Orchardson, W. Q.
Lavery, John
Hornell, Edward
Shannon, James J.

4. *Other Countries.*

In other European countries the development through the Classical, Romantic, and Naturalistic stages was not dissimilar to those already described. All have profited by French technical methods, and are, to a greater or less extent, swayed by Realistic and Impressionistic tendencies. See:

(*a*) Belgian and Dutch:

Gallait, Louis
Leys, Baron Hendrik
Wiertz, Antoine Joseph
Stevens, Alfred
Lempoels, Jeff
Khnopff, Fernand
Israels, Josef
Mesdag, Hendrik
Mauve, Anton
Maris, The Brothers

Gogh, Vincent van
Toorup, Jan

(*b*) Scandinavian and Russian:

Zorn, Anders
Larsson, Carl
Liljefors, Bruno
Kroyer, Peter Severin
Thaulow, Frits
Vereshtchagin, Vassili
Repin, Ilia Yefimovitch

(*c*) Spanish, etc.:

Fortuny, Mariano
Sorolla, Joaquin
Segantini, Giovanni

5. *United States.*

During the Colonial period and immediately after the Revolution, British influences prevailed in the United States, with an inclination to follow the Italians in larger subjects. An indigenous art began with the self-taught Hudson River School, about 1825. Then came the foreign influence, and, since 1875, French methods have been quite generally adopted, the natural characteristics revealing themselves in choice of subject and conceptions.

(*a*) Early Period:

West, Benjamin
Copley, John Singleton
Peale, Charles Wilson
Trumbull, John
Stuart, Gilbert
Allston, Washington
Peale, Rembrandt
Sully, Thomas
Jarves, John Wesley

(*b*) Middle Period:

Hudson River School of Painting
Cole, Thomas
Durand, Asher Brown
Kensett, John Frederick
Church, Frederick Edwin
Bierstadt, Albert
Moran, Thomas
Harding, Chester
Neagle, John
Inman, Henry
Huntington, Daniel
Fuller, George
Ryder, Albert P.
Johnson, Eastman
Brown, John G.
Mount, William Sidney
Leutze, Emanuel
Hicks, Thomas
Hunt, William Morris
Homer, Winslow
Inness, George
Wyant, A. H.
Martin, Homer D.

(*c*) Third, or Cosmopolitan, Period:

(i) Figure and Portrait:

Whistler, James Abbott McNeil
Abbey, Edwin A.
Sargent, John Singer
Vedder, Elihu
Duveneck, Frank
Dielman, Frederick
Chase, William Merrit
Eaton, Wyatt
Weir, James Alden
Thayer, Abbott
Brush, George De Forest
Tarbell, Edmund
Benson, Frank Weston
Dewing, Thomas W.
Blum, Robert F.
Walker, Horatio
Remington, Frederick
Couse, E. Irving
Wiles, Irving
Alexander, John W.

Decamp, Joseph R.
Eakins, Thomas
Beaux, Cecilia
Harrison, (Thomas) Alexander
Melchers, Gari
Cassatt, Mary

(ii) Landscape:

Dewey, Charles Melville
Blakelock, Ralph
Dearth, Henry Golden
Wiggins, Carlton
Robinson, Theodore
Bunce, William Gedney
Murphy, John Francis
Crane, Bruce
Harrison, (Lovell) Birge
Twachtman, John Henry
Dougherty, Paul
Hassam, Childe
Foster, Ben
Schofield, W. Elmer
Redfield, Edward Willis
Symons, Gardner
Chapman, Carlton T.
Waugh, Frederick Judd
Carlsen, Emil

(iii) Mural Painting (q. v.):

La Farge, John
Cox, Kenyon
Blashfield, Edwin H.
Mowbray, Henry Siddons
Rogers, H. O.
Millet, Frank D.
Oakley, Violet

(iv) Recent Tendencies:

Henri, Robert
Bellows, George
Lie, Jonas
Lawson, Ernest
Mora, Luis
Hawthorne, Charles W.
Miller, Richard E.
Friesecke, Frederick Carl
Dabo, Léon

VI. Pastel, Water-Color, and Miniature Painting.

The basis of study should be the general articles on these three varieties of painting, which discuss their technique and history and enumerate the principal artists. The most important of the latter are treated as special titles, to which reference should be made.

Chapter 12. The Minor Arts

A. Engraving

Engraving is the art of producing on a hard surface, such as stone, metal, or wood, incised or relief designs. These may be for purposes of decoration, as in the case of engraved bronzes and silverware, or for stamping a soft substance, as seal rings. But engravings are usually made for the purpose of printing upon paper, and it is this variety with which we are chiefly concerned.

Printing is done either from incised designs to which the ink is applied, or from relief designs, which thus produce the image. In the first process, metal plates, usually of copper, are used; the principal varieties are Line-Engraving and Etching, to which may be added Dry Point, Manière Criblée, and Stipple. The chief form of Engraving in relief is Wood-Engraving; and there are mixed processes, like Aquatint, Mezzotint, and Soft-Ground Etching. The trial impressions upon paper are called the proofs, and the final result the print. The article ENGRAVING contains a general sketch of the subject. See also:

Line Engraving
Etching
Dry Point
Manière Criblée
Stipple
Wood Engraving
Aquatint
Mezzotint
Soft-Ground Etching
Print Proof

I. LINE ENGRAVING.

Line Engraving is done with the burin, usually upon a copper plate. It originated simultaneously in Italy and Germany during the early fifteenth century, probably with the goldsmiths, from the custom of printing trial impressions of niello plates. (See NIELLO.) The earliest line-engravings are mere outline drawings without light or shade. In the early sixteenth century, the art culminated in the works of Albrecht Dürer in Germany, Lucas van Leyden in Holland, and Marcantonio Raimondi in Italy. During the seventeenth century, especially under Louis XIV, France was predominant. But artists devoted themselves increasingly to the reproduction of great paintings instead of original designs. For this reason, the art has gradually sunk into disuse, its place being taken by photographic processes. See:

Line-Engraving (basis of study)
Burin
Niello

1. *Italy:*
   Finiguerra, Tomaso
   Jacopo dei Barbari
   Mantegna, Andrea
   Raimondi, Marcantonio
   Carracci, Agostino
   Piranesi, Giambattista
   Morghen, Raffaello

2. *Germany; Netherlands:*
   Schongauer, Martin
   Dürer, Albrecht
   Lucas van Leyden
   Beham, Hans Sebald
   Beham, Barthel
   Vorsterman, Lucas
   Chodowiecki, Daniel

3. *England:*

Strange, Sir Robert
Vertue, George

4. *France:*

Bosse, Abraham
Nanteuil, Robert
Masson, Antoine
Audran, Gérard
Cochin, Charles Nicolas
Forster, François
Henriquel-Dupont, Louis Pierre
Gaillard, Claude Ferdinand

II. Etching.

In etching, the plate is covered with the ground, usually a varnish, into which the design is scratched with an etching-needle. The plate is then immersed in an acid, which eats the design into the metal. The finishing touches are often done by the dry-point process, a simple scratching of the plate without the use of ground or acid.

Etching upon steel armor, etc., was practiced in the Middle Ages. Dürer was one of the first to use etching for printing purposes, and the art reached its highest development in Holland during the seventeenth century. Many eminent painters practiced it, among whom was the greatest etcher of all times, Rembrandt. Next to Holland, etching was principally cultivated in France, beginning with Claude Lorrain's landscapes. The art found a revival in the nineteenth century, especially in France, but also in England, Germany, and the United States. The following list cites only the principal etchers and a few of the important painters who have practiced etching. See ***Etching*** (basis of study):

1. *Netherlands:*

Lucas van Leyden
Velde, Esaias van de
Rembrandt
Ruisdael, Jacob
Potter, Paul
Van Dyck, Anthonis

2. *France:*

Gelée, Claude (Claude Lorrain)
Flameng, Leopold
Rajon, Paul
Méryon, Charles
Jacquemart, Jules Ferdinand
Legros, Alphonse
Helleu, Paul

3. *Germany:*

Hollar, Wenzeslas
Unger, William
Klinger, Max
Thoma, Hans
Liebermann, Max

4. *Spain:*

Goya, Francisco

5. *England:*

Geddes, Andrew
Wilkie, Sir David
Turner, J. M. W.
Hamerton, Philip Gilbert
Haden, Francis Seymour
Menpes, Mortimer
Brangwyn, Frank

6. *United States:*

Whistler, James Abbott McNeil
Pennell, Joseph
Moran
Parish, Stephen
Platt, Charles A.
Webster, Herman A.

III. Wood Engraving.

In early Wood Engraving, the de-
ing, and the early wood engraving at-

block, and all the wood was cut away except the design, which remains in relief. The process is of peculiar importance because it can be used in connection with printing from movable types.

Crude outline prints from wood-cuts were common in Southern Germany and the Netherlands in the early fifteenth century. The art received an impetus from the invention of printing, and the early wood-engraving attained its most perfect development during the early sixteenth century in the works of Albrecht Dürer and Hans Holbein in Germany. It was introduced by German artists into Italy; but here only the chiaroscuro process attained a high degree of proficiency. (See paragraph *Chiaroscuro* under Wood Engraving.) Wood engraving flourished also in the Netherlands and in France.

Modern wood engraving is done on the cross-grain of boxwood, and with a graver instead of the knife. The design is cut away instead of being left in relief, appearing in white lines. The father of the art was the Englishman, Thomas Bewick (died in 1828), although his pupils achieved much as book illustrators. The art has, during late years, succumbed in England to the more accurate photographic processes. Present German wood engraving is, generally speaking, precise and careful in execution; but the French school has attained the highest artistic perfection.

Before the Civil War, America produced several prominent wood engravers whose work resembled contemporary British. But after 1870, in connection with the popular magazines, a school, headed by Timothy Cole, arose which reproduced the effect of paintings, drawings, etc., with remarkable fidelity, and used the technical proficiency acquired to render portraits and landscapes. Since the perfection of the photographic processes, wood engravers have returned to a more legitimate practice of their art wood engraving. See:

1. *Germany:*
   - Dürer, Albrecht
   - Burckmair, Hans
   - Schäuffelein, Hans
   - Holbein the Younger
   - Lützelburger, Hans
   - Cranach, Lucas
   - Altdorfer, Albrecht
   - Beham, Hans Sebald
   - Aldegrever, Heinrich
   - Baldung, Hans
   - Menzel, Adolf
   - Richter, Ludwig
2. *France:*
   - Cousin, Jean
   - Charpentier, François
   - Bracquemond, Joseph Auguste
   - Johannot, Tony
   - Grandville
   - Gavarni
   - Doré, Gustave
3. *Italy:*
   - Carpi, Ugo da
   - Andreani, Andrea
4. *England:*
   - Bewick, Thomas
   - Blake, William
   - Linton, William James
5. *United States:*
   - Anderson, Alexander
   - Smillie, James D.

Minnesinger
Troubadours
Trouvère
Waits
Ambrosian Chant
Gregorian Chant
Hymnology
National Hymns

3. Musical Organizations, etc.

Guilds, Musical (under Guild)
Conservatory
Conductor
Precentor
Musical Festival
Gesellschaft der Musikfreunde
Gewandhaus-Concerte
Leeds Musical Festival
Choral Societies
Handel and Haydn Society
Oratorio Society
Singakademie
Philharmonic Societies
Boston Symphony Orchestra
Société des Concerts du Conservatoire
Sons of the Clergy Musical Festival
Chicago Symphony Orchestra
Cincinnati Symphony Orchestra
Minneapolis Symphony Orchestra
Three Choirs Festival
Bethlehem, Musical or Bach Festival
Worcester Musical Festival
Peterboro Musical Festival
Bayreuth Musical Festival

4. The Art-Forms.

Canon
Cantata
Catch
Chaconne
Chamber Music
Chant
Chorale
Concerto
Cyclical Forms
Duet
Étude
Fantasia
Form
Fugue
Glee
Humoreske
Imitation
Incidental Music
Interlude
Intermezzo
Introduction
Legend
Leitmotiv
Lied
Musical Drama
Nocturne
Offertory
Overture
Paraphrase
Passion
Pasticcio
Postlude
Pot-pourri
Prelude
Programme Music
Quartet
Recitative
Requiem
Rhapsody
Rondo
Scherzo
Serenade
Singspiel
Solo
Sonata
Song
Suite
Symphonic Poem

Symphony
Trio
Variation

5. Definitions and Descriptions of Terms and Processes Used in the Interpretation of Music.

Musical Dictation
Beat
Baton
Rest
Tempo
Temperament
Rhythm
Syncopation
Expression
Musical Notation
Modulation
Intonation
Fingering
Position
Touch
Phrasing
Slide
Swell
Register
Augmentation
Movement
Passing Notes
Tremolo
Trill
Treble
Bass
Neumes
Value
Clang Tint, Explanation of
Finger-board
Clavichord
Janko Keyboard
Harpsichord
Manual
Metronome
Pedal
String
Virginal
Transposing Instruments
Valves in Musical Instruments (under Valve)
Voice

See also Piano, Organ, Singing, and Musical Instruments.

6. Miscellaneous and Technical Articles.

The reader who has followed the course outlined in the earlier subdivisions, will find that the following articles are mainly specialized statements of general principles with which he is already familiar:

Harmony:

Antiphony
Bar
Cadence
Cantus Firmus
Chord
Chromatic
Clef
Coda
Consonance
Degree
Diatonic Scale
Diazeutic Tone
Discord
Dissonance
Dominant
Figured Bass
Finale
Flat
Fundamental Note
Grace-notes
Guidonian Hand
Harmonics
Homophony
Improvisation
Instrumentation
Interval

Invention
Inversion
Key
Leading Tone
Leading of Voices
Leger-Lines
Major
Measure
Mediant
Melody
Meloplaste
Melos
Mensurable Music
Metre
Minor
Mixed Cadence
Modes
Monody
Motion
Motive
Natural
Nuances
Numerical Notation
Octave
Organ-Point
Organum
Part
Part-music
Passage
Passing Notes
Pitch
Plain Chant
Polyphony
Preparation
Principal
Progression
Reed
Relationship
Scale
Semitone
Sequence
Sharp
Solmization
Subdominant
Suspension
Tablature
Theme
Tierce
Tonality
Tone
Tonic
Tonic Sol-fa
Touch
Transcription
Transposition
Triad
Triplet
Typical Phrase
Unison
Variation

BIOGRAPHY.

A selected list of the world's great composers would include the following names:

Adam, A. C.
Agricola, M.
d'Albert, E.
Allegri, G.
Anerio, F.
Animuccia, G.
Arcadelt, J.
Arne, T. A.
Auber, D. F. E.
Bach, J. S.
Bach, K. P.
Balfe, M. W.
Barnby, J.
Beethoven, L.
Bellini, V.
Benedict, J.
Bennett, W. S.
Berlioz, H.
Bizet, G.
Boieldieu, F. A.
Bononcini, G. B.
Brahms, J.
Bruneau, A.

Bull, J.
Buxtehude, D.
Caccini, G.
Cambert, R.
Carissimi, G.
Cavalieri, E.
Cherubini, M. L.
Chopin, F. F.
Cimarosa, D.
Clementi, M.
Corelli, A.
Cornelius, P.
Couperin, F.
Cui, C.
David, F. C.
Debussy, C.
Deprès, J.
Donizetti, G.
Durante, F.
Dvorák, A.
Elgar, E.
Enna, A.
Festa, C.
Field, J.
Flotow, F.
Franck, C.
Franz, R.
Frescobaldi, G.
Froberger, J. J.
Gabrieli, A.
Gabrieli, G
Gade, N. W
Gibbons, O.
Giordano, U.
Glinka, M. I.
Gluck, C. W.
Goldmark, K.
Gossec, F. J.
Goudimel, C.
Gounod, C. F.
Graun, K. H.
Grétry, A. E. M.
Grieg, E.
Halévy, J. F.
Handel, G. F.
Haydn, J.
Hérold, L. J. F.
Hiller, J. A.
Hofhaimer, P.
Humfrey, P.
Hummel, J. N.
Humperdinck, E.
d'Indy, V.
Ippolitov-Ivanov, M.
Isaak, H.
Isouard, N.
Jommelli, N.
Keiser, R.
Kiel, F.
Lalo, E.
Lasso, Orlando di
Leo, L.
Leoncavallo, R.
Le Sueur, J. F.
Liszt, F.
Logroscino, N.
Lortzing, G. A.
Lotti, A.
Lully, J. B.
MacDowell, E. A.
Mahler, G.
Marschner, H.
Mascagni, P.
Massenet, J. E. F.
Mendelssohn-Bartholdy, F.
Meyerbeer, G.
Monteverde, C.
Morley, T.
Mozart, W. A.
Mussorgsky, M.
Nanini, G. M.
Offenbach, J.
Okeghem
Pachelbel, J.
Paisiello, G.
Palestrina, G. P.
Pergolese, G. B.
Piccini, N.

Ponchielli, A.
Porpora, N. A.
Prätorius, M.
Puccini, G.
Purcell, H.
Raff, J.
Rameau, J. P.
Reger, M.
Rimski-Korsakov, N.
Rossini, G. A.
Rubinstein, A.
Sacchini, A. M.
Saint-Saëns, C. C.
Scarlatti, A.
Schubert, F.
Schumann, R.
Schütz, H.
Sibelius, J.
Sinding, C.
Smetana, F.
Spohr, L.
Spontini, G. L.
Strauss, J.
Strauss, R.
Sullivan, A. S.
Suppé, F.
Tchaikovsky, P. I.
Thomas, A.
Tartini, G.
Verdi, G.
Viotti, G. B.
Volkmann, R.
Wagner, R.
Wallace, W. V.
Weber, K. M.
Willaert, A.
Wolf, H.
Zingarelli, N. A.

NOTE—The names of famous operas, oratorios, symphonies, dances, and national hymns have been omitted from the above classification. In the majority of cases, they will be found under their own proper titles, although brief mention of them would also be found in the general articles OPERA, ORATORIO, SYMPHONY, and NATIONAL HYMNS. The same is true of the scores of musical instruments and musical directions whose names will be found under the general articles ABBREVIATIONS, MUSICAL INSTRUMENTS and TEMPO.

Chapter 14. Mathematics

ROUGHLY defined, mathematics is the science of forms and number. A few of the definitions given by eminent mathematicians are found in the general article MATHEMATICS, which is, therefore, a suitable introduction to the subject. The article gives a condensed history of mathematics, from earliest times to the present, together with a logical classification of the various branches of mathematics.

Mathematical science naturally falls into two main subdivisions: Pure Mathematics and Applied Mathematics. With this division as a basis, various classifications have been attempted. The best classification for the purpose of systematic reading is the one usually followed in the school curriculum, or in the text-books. In accordance with this, we may subdivide Elementary Mathematics into the following branches:

Arithmetic
Algebra
Geometry
Trigonometry
Analytic Geometry
Calculus

1. ARITHMETIC involves three phases: The conception of number, the representation of number by symbols, and the principles and methods of computation. A general discussion of these phases, together with their history, is given in the article ARITHMETIC, which, therefore, should be read as an introduction to this branch.

A more modern phase of arithmetic is computation by calculating machines. This process has already to a large extent replaced computations by hand, and seems to be destined to do so even more in the future.

The general articles bearing on this branch may be conveniently read in the following order:

(*a*) *Principles and Methods of Computation:*

Addition
Subtraction
Multiplication
Division
Arithmetic Signs
Fraction
Involution and Evolution
Proportion
Checking in Arithmetic
Calculating Machines
Slide Rule

(*b*) *Symbols, Representation, and Scales:*

Symbols
Numerals
Decimal System
Scales of Notation

(*c*) *Theory of Numbers:*

Number
Irrational Number
Complex Number

The detailed history of these topics is given separately in each article.

2. ALGEBRA is universal arithmetic, and has many features in common with arithmetic. The fundamental operations are the same, with the exception that algebra takes up the more general cases. The limitations of algebra are brought out in the general article ALGEBRA, where also a history of this branch is given. Since algebra and

arithmetic are so closely related, the fundamental operations are best treated together, and so the general articles bearing on the fundamental operations in algebra have been given under arithmetic. Those belonging almost exclusively to algebra are best taken up in the following order:

Coefficient
Factor
Exponent
Associative Law
Polynomial
Negative Quantity
Binomial
Binomial Coefficients
Binomial Theorem
Remainder Theorem
Equation
Elimination
Substitution
Diophantine Analysis
Series
False Position, Rule of
Cubic Equation
Biquadratic Equations
Permutations and Combinations
Probability
Determinants
Logarithms
Analysis

3. GEOMETRY is the science of form, and geometric concepts arise from the consideration of forms of objects just as numerical concepts arise from considering a collection of objects. Geometry is independent of algebra, and may be studied before or after algebra, but preferably after. The physical scientist considers only the space we live in, while the mathematician considers all possible spaces. Accordingly, we have many different kinds of geometry. A general classification and discussion of the several geometries is given in the article GEOMETRY. Although algebra and geometry are independent, a correspondence may be set up between them. This is brought out in the article CORRESPONDENCE. The general articles are best read in the following order:

Euclid
Axiom
Theorem
Problem
Corollary
Angle
Arithmetic and Geometric Signs
Equiangular
Equilateral
Congruence
Duality
Construction
Locus
Triangle
Circle
Quadrilateral
Polygon
Circumscribed and Inscribed Figures
Contact
Perimeter
Transversal
Antiparallels
Concurrence and Collinearity
Maxima and Minima
Similarity
Symmetry
Plane
Octahedron
Polyhedron
Projective Geometry
Projection
Homology
Perspective
Isoperimetric Figures
Engineering Instruments
Surveying

Planimeter
Mensuration
Protractor
Vernier
Quadrature
Weights and Measures
Duplication of Cube (under Cube)
Quadrature of Circle (under Quadrature)
Trisection of an Angle

4. TRIGONOMETRY in elementary mathematics deals with the study of triangles, and the measurement of their sides, angles, and areas. This is, however, only a part of the general subject. Under the article TRIGONOMETRY, almost a whole text-book treatment is given, together with a short history of the subject from earliest times. As an introduction, read the article LOGARITHMS. An elementary knowledge of algebra and geometry is, however, necessary before the study of trigonometry can be taken up.

5. ANALYTIC GEOMETRY is the application of algebra to geometry, and the combination of the two is the most powerful tool of the modern mathematician. More general results may be deduced, and better classification effected, by means of analysis. In the general article ANALYTIC GEOMETRY, the aim and general method of procedure is given, together with a short history of the subject. The other articles may be conveniently read in the following order:

Coördinates
Graphic Method
Curve
Analysis
Cartesians
Parameter
Locus
Contact
Normal
Tangent
Conic Sections
Circle
Pole and Polar
Parabola
Ellipse
Hyperbola
Surface
Cone
Conoid
Spheroid
Generation

Higher Plane Curves:

In these, are included all transcendental and all algebraic curves above the second order. As an introduction, read the article CURVE. Some of the most important articles are:

Cardioid
Catenary
Cissoid
Conchoid
Curve of Sines
Cycloid
Logarithmic Curve
Spiral
Lemniscate
Loxodrome
Witch

6. CALCULUS. This term usually refers to Differential and Integral Calculus. Differential Calculus deals with the relation between indefinitely small quantities or infinitesimals, and is of great service when the quantities under consideration are constantly changing. The problem of Integral Calculus is the inverse of that of Differential Calculus. Integral Calculus also deals with the application of calculus to mechanics and geometry.

In the general article CALCULUS, the methods and applications of calculus are illustrated by the solution of practical problems. As a historical introduction, read:

Indivisibles (under Cavalieri)
Fluxions

The general article CALCULUS, should also be preceded by:

Analysis
Limits, Theory of
Infinity and the Infinitesimal

and followed by:

Maclaurin's Theorem (under Maclaurin)
Curve
Osculation
Quadrature
Differential Equations (under Equation)

7. HIGHER MATHEMATICS is a collective term for all branches of mathematics that follow calculus. Most of these branches are based on calculus, but some, like the theory of numbers and group theory, are independent of calculus. The following articles will furnish an introduction to some of the branches of higher mathematics:

Forms
Functions
Modern Geometry (under Geometry)
Non-Euclidean Geometry (under Geometry)
Quaternions
Substitution
Theory of Numbers (under Number)

8. APPLIED MATHEMATICS deals with the application of mathematics to related sciences, like Mechanics, Astronomy, Physics, etc. See these departments in this work.

9. BIOGRAPHY. Mathematical knowledge dates back to the Egyptian and Babylonian civilizations, but the real development begins in Greece. This was chiefly in the realms of geometry. Later it inclined toward arithmetic. The Romans did nothing for mathematics, and the Arabs very little more than to translate and preserve the Greek learning. Through them it was introduced into the cloisters in Europe during the Middle Ages. The modern period in the history of mathematics begins with Descartes's invention of analytic geometry. The following is a list of the most eminent mathematicians, arranged according to their nationality or period:

(*a*) *Greek:*

Thales
Pythagoras
Aristotle
Plato
Euclid
Archimedes
Diocles
Nicomedes
Hippias of Elis
Menelaus
Apollonius of Perga
Hero of Alexandria
Ptolemy
Diophantus
Pappus

(*b*) *Arab:*

Al-Khuwarizmi
Al-Battani

(*c*) *Hindu:*

Aryabhatta
Brahmagupta

Bhaskara
Mahavir

(*d*) *Persian:*

Omar Khayyam

(*e*) *From the revival of Mathematics in Europe to the middle of the 17th century:*

Gerbert [under Sylvester (Pope)]
Fibonacci
Jordanus
Peuerbach
Regiomontanus
Paccioli
Tartaglia
Cardan
Viète
Napier
Descartes

(*f*) *From the middle of the 17th century to the present time:*

Desargues
Cavalieri
Pascal
Boscovich
Fermat
Wallis
Barrow, I.
Leibnitz
Newton
Bernoulli, Jakob
Bernoulli, Johann
Bernoulli, Niclaus
Bernoulli, Daniel
Maclaurin
Taylor
Euler
D'Alembert
Monge
Laplace
Lagrange
Legendre
Fourier
Gauss
Poisson
Poncelet
Chasles
Steiner
Cauchy
Möbius
Lobachevsky
Bolyai
Abel
Dirichlet
Hamilton
Jacobi
Plücker
Grassmann
Galois
Cayley
Eisenstein
Weierstrass
Riemann
Smith, H. J. S.
Sylvester
Clebsch
Lie, Sophus
Reye

Chapter 15. Astronomy

ASTRONOMY is the science which treats of the heavenly bodies—the sun and moon, the planets and their satellites, comets and meteors, the stars and nebulæ. Astronomy is usually divided into many branches; these branches, however, are not distinct and separate, but overlap in all directions, so that no convenience as regards treatment is gained. The arrangement of the articles in the following lists is not according to branches, but in accordance with the order in which they may be conveniently read.

A general history of the progress of astronomical discovery is given in the general article ASTRONOMY, which, therefore, forms a suitable introduction to the subject. For a knowledge of a few of the elementary terms used in astronomy, see:

Zenith
Horizon
Equator
Ecliptic
Pole
Azimuth
Altitude
Declination
Latitude and Longitude
Parallels
Meridian
Diurnal Motion
Culmination

1. ASTRONOMICAL OBSERVATIONS.

Astronomical observations are principally of two kinds: To determine distance, linear and angular; and to study the physical conditions of the heavenly bodies.

(*a*) *Instruments:*

Telescope
Sextant
Transit Instrument
Meridian Circle
Equatorial
Zenith Telescope
Micrometer
Chronograph
Chronometer
Spectroscope

(*b*) *Corrections to Astronomical Observations:*

Depression
Parallax
Refraction
Twilight
Aberration

(*c*) *Time:*

The determination of time is one of the most important problems in astronomy, and is effected by observing the time of transit across the meridian of some celestial object. For the determination of time, read:

Transit Instrument
Sextant
Chronometer
Ephemeris
Equation of Time

Various ways of reckoning time have been used in history. Some of the principal ways used by the ancients, and also those used at present, are given in the following articles:

Period
Chronology

Calendar
Hour
Week
Day
Month
Year
International Date Line
Prime Meridian Conference
Time Signals
Time, Standard

2. The Solar System.

The solar system consists of the sun as a central body, around which revolve the planets with their satellites, some periodic comets, and meteoric swarms. In addition to these permanent members, the system is occasionally visited by other comets, which move in parabolic orbits. As a historical introduction, read:

Ptolemaic System
Copernican System

Of the members of the solar system, the planetary system is of most immediate interest to us, since our earth is a member of this system. The sun and the planets, with their satellites and their interrelations, are treated in the following articles:

Sun
Planets
Solar System
Planetoids
Satellites
Vulcan
Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune
Eros
Moon
Gravitation
Parallax
Lunar Theory
Nutation
Perturbations
Precession
Tides
Latitude, Variation of
Seasons
Orbit
Elements
Eclipse

Comets are usually very small in mass, though this has great extent. They move in very eccentric orbits about the sun, and the planes of their orbits present a great variety. The constituent parts and physical characteristics, the mass, the spectra, the number, discoveries, the capture theory, and origin of comets are treated in the article Comet.

Meteors are masses of stone or iron, which sometimes are seen to fall to the earth from the sky. The circumstances of the fall, the meteoric showers, the probable cause, the matter, path, and number of meteors are treated in the articles:

Meteors
Aërolite

3. The Stars.

These bodies are usually called fixed stars, owing to the idea of the ancients that they were without motion. The fixity is, however, now disproved, and observations with the spectroscope show that they are moving with velocities comparable to those of bodies belonging to the solar system. Owing to

their immense distance, they appear, however, to keep their relative positions and configurations unchanged. This is only apparent, and there are stars whose displacement amounts to as much as 1″ a year. In magnitude and physical condition, the stars are comparable with our sun, and many of them greatly exceed our sun in brightness and magnitude. The designation, magnitude, nature, and number of stars, the constellations, stellar parallax, proper motion, spectra, photometry, variable stars, double and multiple stars, binary stars, etc., are treated in the following articles:

Star
Constellation
Culmination
Pole Star
Zodiac
Galaxy
Parallax
Variable Star
Astro-Photography

THE NEBULAE are faintly shining cloudlike patches of matter in the sky, scattered among the stars. They are supposed to be stars under formation. The nature, forms, and magnitudes of nebulæ, the spectra, distribution, distance, etc., are treated in the article NEBULAE.

4. ASTRONOMICAL OBSERVATORIES are buildings where the instruments and machinery necessary for the observation of the heavenly bodies are kept. The equipment, location, etc., together with a description of some of the largest observatories in the world, are treated in the following articles:

Observatory
Lick Observatory
Naval Observatory
Pulkova
Yerkes Observatory
Greenwich Observatory
Harvard College Observatory
Mount Wilson Solar Observatory

5. COSMOGONY deals with the theory of operations by which the present condition of the universe came about. Various systems of cosmogony have prevailed at different times. See:

Cosmogony
Nebulæ

6. ASTROLOGY deals with the supposed influence of the heavenly bodies upon human affairs and the drawing of horoscopes. Astrology was the forerunner of astronomy, and for centuries astronomical observations were made mainly to supply data for astrology. See ASTROLOGY.

7. BIOGRAPHY.

Observational astronomy dates back to the Chinese and Chaldæans, but the first real attempt to explain the movements of the heavenly bodies is due to the Greeks. The ideas of the Greeks held sway till Copernicus substituted a more harmonious system. Gravitational astronomy begins with Newton, who made it possible to explain the movements of the heavenly bodies, while Galileo's invention of the telescope gave a means of finding out what they are in themselves. The following is a list of the most prominent contributors to astronomy:

Hipparchus
Ptolemy
Brahe
Kepler
Galileo

Galileo
Newton
Bradley
Halley
Roemer
Cassini, Jacques
Cassini, G. D.
Flamsteed
Herschel, Sir William
Herschel, Sir J. F. W.
Laplace
Bessel
Bode
Delambre
Olbers
Piazzi
Pond
Baily
Hansen
Struve, F. G. W.
Encke
Leverrier
Adams, J. C.
Airy
Rosse
Rutherford
Struve, Otto
Galle
Huggins
Lockyer
Gill, Sir David
Pickering
Hale, G. E.

Chapter 16. Physics

IN undertaking systematic reading in any particular science, it is well at the outset to realize the province and limitations of that science, as they have been determined and observed in the past by its devotees, and what, if there have been changes, is the modern conception of the scope of the particular department of knowledge so known. With this especial object, the article on PHYSICS has been written, and serves to introduce the reader to the subject, as discussed in more detail under the broad subdivisions of ACOUSTICS, ELECTRICITY, HEAT, LIGHT, MECHANICS, LABORATORY, MAGNETISM and RADIOACTIVITY. Taking up these subjects separately, and also the article on LABORATORY, we shall find in each case the general article referred to, and such minor articles as are demanded.

1. ACOUSTICS.

Dealing with theoretical questions, the more important topics on the nature and theory of sound are included in the following list:

Acoustics
Section *Origins* under Music
Diatonic Scale
Phonetics
Resonance
Resonator
Node

For special purposes and investigation dealing with the production and propagation of sound waves, there has been devised much interesting apparatus, certain forms of which, as the telephone, phonograph, megaphone, etc., have found their way into universal application. See:

Siren
Speaking Trumpet
Megaphone
Ear-Trumpet
Acoumeter
Phonograph
Talking Machine
Graphophone
Telephone
Tuning-Fork
Organ

2. ELECTRICITY.

To supplement the general article ELECTRICITY, and those of a theoretical nature treating Ionization and Electrons, it is desirable to consult articles dealing with the generation of the current, as DYNAMO-ELECTRIC MACHINERY, the VOLTAIC CELL, the DRY PILE, THERMO-ELECTRICITY, and also study the effects of INDUCTION and self-induction. We can learn how the magnetic strength of a solenoid is influenced by the number of AMPERE TURNS. As supplemental, then, to the article on electricity, the following articles may be cited:

(*a*) *Fundamental Phenomena:*
Current
Conductor
Resistance
Shunt
Electrostatics (under Electricity)
Condenser
Ampere Turns
Solenoid
Induction
Induced Electric Currents (under Electricity)
Foucault Currents

(*b*) *Electrical Units:*
Electrical Units

Ampere
Volt
Ohm
Henry
Farad
Coulomb
Watt

(*c*) *Electrostatic Apparatus:*

Electrophorus
Electrical Machine
Electroscope
Leyden Jar (under Condenser)
Barometric Light
Brush
Elmo's Fire, Saint

(*d*) *Measuring Instruments:*

Galvanometer
Ammeter
Voltmeter
Voltameter
Wheatstone's Bridge
Electrometer
Electric Meters
Induction Balance

(*e*) *Discharge in Gases or in Vacuo:*

Anode
Discharge through Gases (under Electricity)
Geissler's Tubes
Crookes Tube
X-Rays

(*f*) *Electric Currents:*

Galvanic Battery
Voltaic Cell or Battery
Dry Pile
Storage Battery
Dynamo Electric Machinery
Thermo-Electricity
Thomson Effect

3. HEAT.

Following the arrangement already specified for the study of heat, reference should be made to CALORIMETRY to ascertain how the amount of heat possessed by various bodies is measured, and to THERMOMETRY to learn how the temperature or degree of heat is determined. THERMODYNAMICS enables us to consider the relation between heat and work. See:

Heat
Calorimetry
Thermometry
Diathermancy
Regelation
Radiation
Thermodynamics
Spheroidal State

Of a more practical character, are those articles involving the consideration of methods and apparatus, such as those which discuss the LIQUEFACTION OF GASES and FREEZING MIXTURES. A list of this kind would include:

Cryophorus
Freezing Point
Freezing-Mixtures
Liquefaction of Gases
Melting-Point
Boiling-Point
Critical Point
Refrigeration
Zero
Thermometer
Pyrometer
Thermoscope
Microtasimeter
Radiation
Radiometer
Radiation Pressure
Bolometer
Hygrometer
Safety-Lamp

4. Magnetism.

Complete articles on Magnetism in general and on Terrestrial Magnetism, with charts, leave but little to be said in addition. The instruments used in studying magnetism, and especially the ship's compass, with its important adjustments, are also the subjects of further description. See:

Magnetism
Terrestrial Magnetism
Diamagnetism
Compass
Declination
Declinometer
Dipcircle
Inclination
Isoclinic
Isogonic
Magnetometer
Magnetic Elements
Magnetic Equator
Magnetic Observatory
Armature
Alloys, Magnetic
Astatic Needle

5. Light.

In the study of optics, there are numerous opportunities to branch off from a general treatment and carry on independent investigation in a particular field. Starting with the motion of the ether, known as light, we are able to study its Velocity and also the intensity. For the latter, photometers are employed, and the subject of Photometry presents a record of many different instruments and methods. The useful application of light is included under Illumination. By reason of its wave motion when Diffraction and Interference take place Fringes are formed, and also there results the phenomenon known as colors of thin plates. This principle of interference is the basis of one process of Color Photography; several processes are described under that title. In fact, numerous other examples could be cited, but reference to the following list will clearly indicate the extent of the range of subjects:

(*a*) *Light:*
Light
Velocity of Light
Ether
Diffraction and Diffraction Gratings
Interference
Fringes
Colors of Thin Plates (under Light)
Newton's Rings
Photometry
Reflection
Caustic
Refraction
Polarization
Prism
Dispersion
Color
Complementary Colors
Achromatism
Rainbow
Lens
Foci
Aberration, Chromatic
Aberration, Spherical
Spectroscopy
Fluorescence
Phosphorescence
Zeeman Effect
Mirage
Fata Morgana

(*b*) *Optical Instruments:*
Telescope
Opera Glass

Field Glass
Object-Glass
Eyepiece
Field of View
Microscope
Solar Microscope
Camera Lucida
Camera Obscura
Aplanatic Lens
Spectroscope
Stereoscope
Magic Lantern
Moving Pictures
Kinetoscope
Dissolving Views
Diaphragm
Polariscope
Nicol Prism
Analyzer
Polar Clock
Kaleidoscope
Chromatrope
Zoëtrope
Fluoroscope
Diaphanoscope
Cyanometer
Dioptometer
Magic Mirror of Japan

(c) *Photographic Processes:*

Photography
Photo-Chemistry
Negative
Ambrotype
Daguerreotype Process
Copying
Color Photography
Photo-Engraving
Calotype Proccess
Cyanotype Process
Ferrotype
Fothergill Process
Photolithography (under Lithography)
Gelatin Process

6. MATTER AND MECHANICS.

Under this head, we may include a consideration of matter, including its general properties and the theories advanced to explain it, as well as the questions concerned with the motion of matter, and the methods and units employed to measure this motion. Considering the first subdivision, it is necessary to concern ourselves with the following titles:

Matter
Vortex
Molecules
Inertia
Porosity
Ductility
Elasticity
Flexure
Viscosity
Gases, General Properties of
Effusion
Cohesion
Adhesion

The science of mechanics deals with the motion of matter. After reading the fundamental article MECHANICS, the reader will be prepared to appreciate the associated articles as well as those dealing with the various stages of applied mechanics. Included in the former class, are the following:

Mechanics
Dynamics
Kinetics
Kinematics
Statics
Moment
Momentum
Velocity
Acceleration
Force
Potential

Central Forces
Couple
Energetics
Centre of Gravity
" " Gyration
" " Inertia
" " Oscillation
" " Percussion
" " Pressure
Aerostatics
Aerodynamics
Pneumatics
Hydrostatics
Hydrodynamics
Vortex
Waves
Stability
Impact
Gravitation
Falling Bodies
Vector
Capillarity
Mechanical Powers
Inclined Plane
Lever
Wheel and Axle
Pulley
Pendulum
Projectiles, Motion of

In order to measure motion and its effect, there are required systems of units, and these are usually arranged on such a basis that they are parts of a symmetrical system, such as the C. G. S. (Centimeter, Gramme, Second) system. This matter is fully explained in the following articles:

C. G. S.
Mechanical Units
Dimensions
Dyne
Erg
Foot-Pound
Joule
Watt
Kilowatt
Horse-Power

For the measurement and study of matter and its motion and other properties, numerous important pieces of physical apparatus have been devised. Thus, to measure the pressure of the atmosphere, or a gas, we have the BAROMETER and the MANOMETER. To remove the air from a vessel, the AIR PUMP is applied. For the linear measures, we have scales constructed with the DIVIDING ENGINE and compared with standards on the COMPARATOR. Instruments of such nature are included in the following list:

Air Pump
Barometer
Barometer, Water
Aneroid
Manometer
Magdeburg Hemispheres
Specific Gravity
Hydrometer
Jolly Balance
Balance
Spring Balance
Weighing Machine
Torsion Balance
Weights and Measures
Metric System
Dividing Engine
Comparator
Atwood's Machine
Barker's Mill
Hero's Fountain

7. MODERN THEORIES.

Modern Physics has many recent developments to record in the field of theory and many of the ideas once considered fixed and definite have been put to the test severely under later

conditions. Even GRAVITATION, whose laws were once considered fundamental, has been considered in the light of modern thought, while the recognition of the ELECTRON and the part played by IONIZATION has modified our original idea of ELECTRICITY and the ETHER. Furthermore, we have the new conception of RELATIVITY. Whatever the existence of matter and its explanation, yet when electrical oscillations take place or material bodies emit energy, or as it is termed, RADIATION, a wide range of phenomena is produced ranging from the Electromagnetic waves used in WIRELESS TELEGRAPHY and TELEPHONY to the waves of light. When the radiations are produced by the discharge of electricity through a vacuum we have the phenomena of the X-rays, while if the radiations are furnished spontaneously, as by such radioactive elements as RADIUM, THORIUM, etc., there are afforded the varied series of phenomena that would seem to indicate transformation of one element to another and bear an important relation to the theory and explanation of matter. Accordingly, in this connection, one could read with profit the articles on:

Ether
Gravitation
Relativity
Radiation
Radiation Pressure
Radium
Radioactivity
Electricity
Light
X-rays
Waves

RADIOACTIVITY, by reason of its relation to theories of matter and the involved phenomena, both physical and chemical, is now entitled to stand as a distinct Department of Physics, in so far as the physical phenomena are concerned.

The main article on this subject deals with the theories which have been advanced to explain the many interesting phenomena of the Radioactive substances. Accordingly one should read, in addition to this article, those on the various Radioactive elements, such as:

Radium
Uranium
Actinium (particularly)
Thorium
Polonium

The biographies of the leading workers in this field, such as the Becquerels, Sir William Crookes, Professor and Madame Curie, Ernest Rutherford, Frederick Soddy and J. J. Thomson. and others referred to in the various articles. should also be read.

8. BIOGRAPHIES OF PHYSICISTS.

Some of the greatest achievements in that branch of science which is now known as Physics have been the work of philosophers who have also accomplished much in other fields, and consequently it is impossible, particularly in the case of ancient and mediæval scientists, to term them physicists, and include them in such a list. Also, in modern times, the work of the chemist, of the engineer, of the meteorologist, of the astronomer, and of other scientific workers, closely approaches or actually transgresses the limits which the physicist has set for himself. Therefore, the following list does not include all the principal workers, but a

certain number who primarily are distinguished for their work in physics.

Abney, W. de W.
Amici, G. B.
Amontons, G.
Ampère, A. M.
Arago, D. F.
Archimedes
Atwood, George
Bache, Alex. D.
Bacon, Roger
Becquerel, A. C.
Becquerel, A. E.
Becquerel, A. H.
Bell, A. G.
Biot, Jean B.
Boyle, Robert
Brewster, Sir D.
Bunsen, R. W.
Cailletet, L. P.
Carhart, H. S.
Carnot, N. L. S.
Cavendish, H.
Chladni, E. F. F.
Clausius, R. J. E.
Coulomb, C. A.
De la Rive, A. A.
Dollond, John
Dove, H. W.
Edison, T. A.
Ewing, J. A.
Fahrenheit, G. D.
Faraday, M.
Ferrari, G.
Fleming, J. A.
Forbes, J. D.
Foucault, J. B. L.
Fraunhofer, Joseph von
Fresnel, A. J.
Galvani, L.
Gauss, K. F.
Gay-Lussac, J. L.
Geissler, H.
Gilbert, W.
Glazebrook, R. T.
Gray, Elisha
Grove, Sir W. R.
Guericke, O. von
Haidinger, W. von
Halley, E.
Hauksbee, F.
Helmholtz, H. von
Henry, Joseph
Hero of Alexandria
Herschel, Sir W.
Hertz, H.
Hittorf, J. W.
Holtz, W.
Hopkinson, J.
Huygens, C.
Jenkin, H. C. F.
Jolly, P. von
Joule, J. P.
Kater, H.
Kirchhoff, G. R.
Kohlrausch, F.
Kundt, A.
Laplace, P. S. de
Leslie, Sir J.
Lodge, Sir O. J.
Magnus, H. G.
Malus, E. L.
Mariotte, E.
Mascart, E. E. N.
Maxwell, J. C.
Mayer, A. M.
Mayer, J. R. von
Mendenhall, T. C.
Michelson, A. A.
Morse, S. F. B.
Newton, Sir Isaac
Nichols, E. L.
Oersted, H. C.
Ohm, G. S.
Ostwald, W.
Papin, D.
Pictet, R.
Plateau, J. A. F.

Pupin, M. I.
Quincke, G. H.
Rankine, W. J. M.
Rayleigh, J. W. S.
Réaumur, R. A. F. de
Regnault, H. V.
Roentgen, W. K.
Rowland, H. A.
Rühmkorff, H. D.
Sabine, Sir E.
Siemens, Sir W.
Somerville, Mary
Steinheil, K. A.
Stevin, S.
Stokes, Sir G. G.
Tait, P. G.
Tesla, N.
Thompson, S. P.
Thomson, Sir J. J.
Thomson, William (Lord Kelvin)
Torricelli, E.
Trowbridge, J.
Tyndall, J.
Van't Hoff, J. H.
Violle, J.
Volta, A.
Watt, J.
Weber, W.
Wheatstone, Sir Charles
Wiedemann, G.
Wilde, H.
Woodward, R. S.
Wroblewski, Z. F.
Young, T.

Chapter 17. Aëronautics

IN only a very recent work of reference would it be possible to assemble a number of articles dealing with the modern theory and art of aërial navigation. Indeed, the practice of aëronautics has been so affected by the great War in Europe that the military and naval aspects of the matter have become predominant, and while the mechanical features are closely connected, yet the general reader at the present time is likely to be more concerned with the use of the aëroplane and dirigible in warfare.

In the NEW INTERNATIONAL ENCYCLOPÆDIA the student will find first a general article on AËRONAUTICS, in which the history of the evolution of the dirigible or airship from the balloon and of the aëroplane, from the earliest attempts at securing flight with a machine heavier than the displaced air, is traced. He will also find in the article on GASES, GENERAL PROPERTIES OF, the fundamental theory involved, and in the articles on MILITARY and NAVAL AËRONAUTICS the applications to warfare. In the section on *Aërial Operations*, in the long article on the WAR IN EUROPE, will be found a discussion of the use made of these machines in reconnaissance and combat.

The successful evolution of machines that could navigate air also has brought about legal problems and indicated changes both in international law and in other statutes or principles of law involved in the rules of the road and other obvious practices. Accordingly, a list of useful articles for one engaged in research in this field would be the following:

Aëronautics
Aërodynamics
Aërostatics
Military Aëronautics
Hangar
Navigation, Aërial, Law of
International Law
War in Europe (Section on Aërial Operations)
Gases. General Properties of
Internal Combustion Motors
Military or Man-Raising Kite
Kite

Chapter 18. Chemistry

THE importance, for practically everybody, of acquiring a knowledge of chemistry hardly needs to be emphasized. Chemical facts and principles are involved, to a considerable extent, in every science and in every branch of industry, and chemical questions come up often in nearly every sphere of human activity.

In the NEW INTERNATIONAL ENCYCLOPÆDIA the science and applications of chemistry are treated in a large number of articles, many of which were written so as to serve a double purpose: first, to supply information on their special topics, without reference to chemical science as a whole, or to any other chemical topic; secondly, to form integral parts of an exposition of chemistry, for those who may desire to use the Encyclopædia for the acquisition of a general acquaintance with the subject. To serve the second purpose, they were written from a single viewpoint—on the whole, that of the German school of physical chemistry, now all but universally recognized as the best founded and most fruitful mode of viewing chemical phenomena. To serve the first purpose, which is all-important in a work of reference, each article (with few unavoidable exceptions), besides being written in simple terms, is supplied with all the information that is necessary to an understanding of the subject it treats, so that in most of the articles, no preliminary chemical knowledge is pre-supposed. But even in those articles in which the assumption of some preliminary knowledge could not, for obvious reasons, be avoided, no information was pre-supposed beyond what may be readily found in the Encyclopædia itself. Furthermore, in most of the articles the more essential information is concentrated in the opening paragraphs, the more technical and less essential in later parts of the article; so that glancing over the first paragraph alone may be sufficient for many purposes. If the end in view be the acquisition of some general knowledge of chemistry, the articles should be read entirely and carefully and the leading points briefly noted down, so as to afford, at any time of the reading, a clear retrospect over the ground covered.

For purposes of systematic reading, the chemical articles in the Encyclopædia may be grouped as follows: 1, Those dealing with general fundamental principles; 2, those dealing with the principal classes of carbon compounds; 3, those dealing with the theories of physical chemistry; 4, those articles, or sections of articles, dealing with the history of chemistry; 5, articles on the chemical elements; 6, articles on the principal compounds occurring in the living organism; 7, articles on other substances, inorganic and organic, presenting either theoretical or practical interest. In the following chapter devoted to INTERNATIONAL CHEMISTRY, as well as in the section on *Manufactures*, will be found listed and discussed the articles that deal with modern industrial processes and their products.

The order of this classification is based on the relative importance, to the general reader, of principles and facts. Should the course of syste-

matic reading be interrupted at some stage, a knowledge of at least some of the principles of chemistry ought to be much more valuable than a knowledge of some data concerning individual compounds, such as would be acquired if, following the usual order of chemical studies in schools, the course should be commenced by a perusal of the descriptive articles on the elements and their principal inorganic compounds.

1. Fundamental Principles and Phenomena.

Chemistry
Analysis, Chemical
Atomic Weights
Avogadro's Rule
Molecules
Periodic Law
Spectrum Analysis
Reaction, Chemical
Decomposition
Dissociation
Catalysis
Nascent State
Combustion
Spontaneous Combustion

2. Carbon Compounds.

The compounds of carbon, numbering roughly 150,000, form the subject of organic chemistry, one of the most extensive and important branches of modern chemical science. In this branch the atomic and other theories have found a field for some of their most useful applications; and it is, therefore, advisable to acquire some knowledge of it at any early stage in chemical reading. The following is a list of the principal articles dealing with this branch; to be supplemented, of course, on the practical side by those dealing with industrial processes as given in the following chapter:

Carbon Compounds
Stereo-Chemistry
Alcohols
Mercaptans
Ethers
Aldehydes
Ketones
Amines
Amides
Ureas
Valence
Carbohydrates
Phenols
Organo-Metallic Bodies
Alkaloids

3. Physical Chemistry.

Within recent years, physical chemistry has attained a degree of importance which makes some knowledge of it indispensable.

It is believed that this justified the introduction in the Encyclopædia of a somewhat extensive treatment of the subject. Following is a list of the principal articles, in the order in which it would seem advisable to read them:

Avogadro's Rule
Boiling-Point
Freezing-Point
Melting-Point
Solution
Dissociation
Colloids
Thermo-Chemistry
Phase Rule
Electro-Chemistry, General
Photo-Chemistry
Critical Point
Evaporation

Distillation
Sublimation
Radioactivity

4. History of Chemistry.

The history of a great science, if studied after some knowledge of the principles and problems of the science has been acquired, has in itself a fascination for almost every mind. But, in the case of chemistry, many authorities have maintained that a knowledge of the history is not merely interesting, but absolutely indispensable to a thorough understanding of the science itself. In the Encyclopædia, a simple presentation of the development of chemical thought, and the gradual elimination of past errors of principle and method, will be found in the general article Chemistry. Further historical information will be found in the article Alchemy, in the articles on physical chemistry, in those describing the elements and many chemical compounds, and especially in the biographies of celebrated chemists. Following is a list of some of the best-known names in the history of chemistry:

Helmont, J. B. van
Becher, J. J.
Stahl, G. E.
Black, J.
Priestley, J.
Cavendish, H.
Lavoisier, A. L.
Klaproth, M. H.
Dalton, J.
Wollaston, W. H.
Berzelius, J. J.
Davy, H.
Berthollet, C.
Avogadro, A.
Gay-Lussac, J. L.
Mitscherlich, E.
Liebig, J.
Wöhler, F.
Chevreul, M. E.
Dumas, J. B.
Laurent, A.
Gerhardt, K. F.
Gmelin, L.
Sainte-Claire Deville, H. E.
Cannizzaro, S.
Graham, T.
Kolbe, H.
Bunsen, R. W.
Roscoe, H. E.
Berthelot, P. E. M.
Wurtz, C. A.
Hofmann, A. W.
Regnault, H. V.
Pasteur, L.
Mendeléeff, D.
Schorlemmer, C.
Baeyer, A.
Fischer, E.
Van't Hoff, J. H.
Ostwald, W.
Nernst, W.
Arrhenius, S.
Curie, M. S. and P.
Crookes, W.
Ramsay, W.

5. The Chemical Elements.

The articles on the chemical elements will be found to contain descriptions, not only of the elements themselves, but also of their principal compounds, so that each article forms a chapter of inorganic chemistry. Following is a list of some of the principal articles in a recognized order of arrangement:

Hydrogen
Oxygen
Nitrogen
Carbon

Chlorine
Bromine
Iodine
Fluorine
Sodium
Potassium
Lithium
Magnesium
Calcium
Strontium
Barium
Zinc
Cadmium
Mercury
Boron
Aluminium
Silicon
Tin
Lead
Zirconium
Thorium
Phosphorus
Arsenic
Antimony
Bismuth
Sulphur
Selenium
Tellurium
Chromium
Molybdenum
Tungsten
Uranium
Manganese
Iron
Cobalt
Nickel
Platinum
Palladium
Copper
Silver
Gold

Articles on the rest of the elements, including the rare gases ARGON, HELIUM, NEON, KRYPTON, and XENON, and of the radioactive elements, including RADIUM, POLONIUM, ACTINIUM, and THORIUM, will be found in their proper places. In connection with the radioactive elements, reference should be made to the article on RADIOACTIVITY. A list of the elements, with their chemical symbols and atomic weights, will be found in the article ATOMIC WEIGHTS.

6. COMPOUNDS OCCURRING IN LIVING ORGANISMS.

Physiological chemistry deals with the individual compounds forming the chemical ingredients of the materials of which living organisms and their products (*e. g.*, milk) are made up. A knowledge of the chemical and physical properties of those compounds is indispensable in the study of chemical physiology, and hence of physiology in general. The following is a list of the more important physiological compounds described under their names in the Encyclopædia:

Albumen
Allantoïn
Carbohydrates
Cellulose
Carnin
Casein
Cerebrin
Chitin
Cystin
Elastin
Fats
Fibrin
Gelatin
Globulins
Glycogen
Guanin
Hypoxanthin
Keratin

Kreatin
Kreatinin
Legumin
Leucin
Ossein
Proteins
Starch
Syntonin
Taurin
Urea
Uric Acid
Hæmatin
Hæmoglobin

7. Other Important Articles on Chemical Subjects.

(*a*) *Metallic Alloys:*

Alloy
Amalgam
Babbitt Metal
Brass
Britannia Metal
Bronze
Fusible Metal
German Silver
Phosphor-Bronze
Pewter
Pinchbeck
Platiniridium
Spence's Metal

(*b*) *Bases:*

The inorganic bases, *i. e.*, metallic oxides and hydroxides, are mostly described in connection with the metallic elements. Important special articles are:

Ammonia
Lime
Soda

The articles on organic bases include:

Amines
Ethylamine
Trimethylamine
Aniline
Pyridine
Quinoline
Alkaloids
Ptomaines

The article Alkaloids contains a list of the important members of this class of substances, with their principal characteristics. More extensive descriptions are given in the special articles on all the more important alkaloids.

(*c*) *Acids:*

All the more important acids are described in special articles under their names. Many acids of secondary importance are mentioned in connection with their characteristic elements. Following is a partial list of important articles on acids:

i. General:

Acids
Phenols

ii. Inorganic:

Sulphuric Acid
Hydrochloric Acid
Nitric Acid
Sulphureted Hydrogen
Phosphoric Acid
Hydrobromic Acid
Hydriodic Acid
Hydrofluoric Acid
Chloric Acid
Perchloric Acid
Hypochlorous Acid
Nitrous Acid
Hyponitrous Acid
Phosphorous Acid
Hypophosphorous Acid
Manganic and Permanganic Acids

iii. Organic:

Acetic Acid
Benzoic Acid
Butyric Acid
Caproic, Caprylic, and Capric Acids
Carbolic Acid
Carbonic-Acid Gas
Cinnamic Acid
Citric Acid
Cyanic Acid
Cyanuric Acid
Formic Acid
Fumaric and Maleic Acids
Gallic Acid
Glycin
Hippuric Acid
Hydrocyanic Acid
Hydroferricyanic Acid
Hydroferrocyanic Acid
Lactic Acid
Lauric Acid
Malic Acid
Margaric Acid
Meconic Acid
Myristic Acid
Œnanthylic Acid
Oleic Acid
Oxalic Acid
Palmitic Acid
Picric Acid
Stearic Acid
Succinic Acid
Tannic Acid
Tartaric Acid
Uric Acid
Valeric Acid

An important "homologous series" of acids, included in this list, is constituted by the following so-called "fatty acids":

Formic
Acetic
Butyric
Valeric
Caproic
Caprylic
Capric
Senanthylic
Lauric
Myristic
Palmitic
Margaric
Stearic

Allied to the last-named is Oleic Acid.

The acid anhydrides are mostly mentioned in connection with the metalloid elements.

(*d*) *Salts:*

Salts are mostly described in connection with either the acids or the bases combined in them. The following are a few special articles on salts:

Alum
Borax
Cream of Tartar
Epsom Salt
Glauber's Salt
Iodides
Rochelle Salt
Ichthyol
Saltpetre
Soda

Bases, acids, and salts constitute together the so-called "electrolytes." Their peculiar behavior in aqueous solutions has led to the formulation of the now well-known theory of electrolytic dissociation, which may be found treated in the articles Solution, Dissociation, and Acids.

(*e*) *Hydrocarbons*:

Hydrocarbons
Methane

Ethane
Propane
Butane and Isobutane
Ethylene
Acetylene
Benzene
Naphthalene
Anthracene

Further information concerning hydrocarbons may be found in articles on such products as oils (volatile), paraffin, ozokerite, petroleum, benzine, rubber, gutta-percha, gas (illuminating and natural), etc.

(*f*) *Other important compounds:*

Water
Hydrogen Dioxide
Ozone
Alcohol
Methyl Alcohol
Glycerin
Mannite
Aldehyde
Chloral
Acetone
Almonds, Volatile Oil of
Acrolein
Acetone
Ether
Chloroform
Iodoform
Nitro-Benzene
Carbides
Calcium Carbide
Carbon Disulphide
Carbonic Oxide
Cyanogen

(*g*) *Pigments, Dyestuffs, and Allied Subjects:*

Paints
Mineral Colors
Vegetable Colors
Dyeing
Mordants
Coal-Tar Colors
Tar
Coal Tar
Indigo
Alizarin
Purpurin
Aurin
Rosolic Acid
Archil
Arnotto
Carmine
Cochineal
Flavin
Fustic
Henna
Indian Yellow
Lac Dye (under Lac)
Litmus
Madder
Orcin
Orcein
Logwood
Murexid
Phenicin
Quercitron
Green
Brunswick Green
Turkey Red
Cinnabar
Blue
Indigo
Lampblack
White Lead

A list of the widely used coal-tar colors ("aniline dye-stuffs"), with their principal characteristics, will be found in the article COAL-TAR COLORS.

(*h*) *Waxes, Fats, Oils, and Soap:*

Waxes
Beeswax
Spermaceti

Fats
Palmitin
Stearin
Olein
Oils
Almonds, Expressed Oil of
Almonds, Volatile Oil of
Canada Balsam
Castor Oil
Cod-Liver Oil
Croton Oil
Garlic, Oil of
Grass-Oil
Gurjun Balsam
Lemon Oil
Menthol
Petroleum
Turpentine
Wintergreen, Oil of
Soap

All the typical waxes and oils are described in the general articles under these names. Paraffin, which is sometimes spoken of as "paraffin wax," is described in an article under its own name.

(*i*) *Gums and Resins:*

Gums
Resins
Amber
Ammoniac
Anime
Arabin
Copal
Bassora Gum
Bdellium
Catechu
Dragon's Blood
Gambir
Gamboge
Gum Arabic (under **Gums**)
Kino
Mucilage
Olibanum
Podophyllin
Rosin
Sandarac
Scammony

Camphor, which is sometimes spoken of as "gum camphor," is described under its own name. "British gum," a substitute for gum arabic, is described under DEXTRIN.

(*j*) *Explosives:*

The chemistry of EXPLOSIVES, both those employed for military purposes and in mining and other industries, represents a field in which the theoretical and technological advances have been extraordinary, and the new compounds that the chemist has invented have played their part in peace and war. In no department of chemistry have there been more interesting developments than in the theory of Explosives and the various groups into which modern Explosives are classified all present interesting theoretical considerations for the chemist.

Accordingly, the student interested in the history, classification and theory of Explosives, and wishing to learn of the various explosive mixtures, of the nitrates, of the chlorates and perchlorates, and compounds derived by nitro-substitution, and those compounds known as nitro-derivatives, as well as smokeless powders, nitroglycerin, fulminates and amides, should read the article on EXPLOSIVES, which not only discusses theory, but the growth of the industry in the United States and the use of Explosives in industry, such as for blasting and mining, and the regulations attending their transportation and stor-

age. Of course, the older forms of Explosives are discussed under gunpowder, while GUNCOTTON, NITRO-GLYCERIN and NITRO-CELLULOSE show the application of these substances to this branch of chemistry. *Dynamite* is typical of the articles on high power explosives, while the article on TRINITROTOLUENES describes one of the latest of the powerful military explosives.

An appropriate list for careful reading in this department would be as follows:

Dualine
Dynamite
Extralite
Explosives
Emmensite
Nitroglycerin
Guncotton
Gunpowder
Melinite
Lyddite
Magazine
Nitrocellulose
Pyroxylin
Stemming
Trinitrotoluenes

(*k*) *Waters:*

Water
Ice
Distilled Water
Aërated Waters
Carbonated or Acidulous Waters
Chalybeate Waters
Mineral Waters
Selters Water
Apollinaris Water

Many of the foregoing articles are concerned either with theory or with the nature and composition of various chemical elements or substances, apart from their uses in the arts, where the labors of modern research chemists have found wide and useful application. Accordingly, the following chapter on INDUSTRIAL CHEMISTRY will take up some of the more important substances and processes that enter into modern technology.

Chapter 19. Industrial Chemistry

HAVING mastered the underlying principles and more important facts of chemistry, such as the nature of the various elements, the conditions under which they exist and the laws under which they combine, and the most generally and commonly employed chemical substances, the reader interested in the practical applications of this vast field of theoretical science naturally will desire information as to the extent to which scientific chemistry figures in the arts, and some description of the various technological processes involved in wholesale production. Methods of manufacture representing theory reduced to practice often involve the results of the most refined research and scientific investigation, by which everyday materials are produced for general use and the benefit of mankind. Vast industries involving both inorganic and organic chemistry have been built up on the labors of the scientist, and as trade follows the flag so manufacturing prosperity follows and in large measure depends on the labors of the industrial chemist.

The reader of this department in THE NEW INTERNATIONAL ENCYCLOPÆDIA, who first has studied the leading articles of the last chapter, probably would be best served by taking up first the articles dealing with the various processes of industrial chemistry, noting especially how the methods of the factory differ from those of the laboratory.

Leading articles in this field would be:

Lixiviation
Evaporation
Distillation
Sublimation
Filter and Filtration
Filter Press
Bleaching
Calcining
Refrigeration
Roasting
Electro-Chemistry

FUEL.

Then, as heat plays an important part in all industry, chemical and other, a study of fuels would be next in order. Fundamentally and generally these are discussed in the article on FUEL. There are articles on the various solid and liquid fuels to which reference should be made for the important by-products involved, as in the case of the coal-tar colors, ammonia, hydrocarbons and other substances from the coal gas plants and coke ovens. These represent quite an important field of chemistry. Therefore, it may be suggested that the articles be taken up as follows:

Solid Fuels:

Charcoal
Coal
Anthracite
Bituminous Coal
Tar
Lignite
Coal Tar
Coke
Peat

Liquid Fuels:

Alcohol

Petroleum
Kerosene
Oil

Gaseous Fuels:

Gas, Illuminating and Fuel
Acetylene
Calcium Carbide
Gas Engine
Internal Combustion Engine
Motor Vehicle

WATER.

The Industrial Chemist after fuel is next concerned with Water. It may be hard or soft, saline or alkaline, suitable or unsuitable for use in a boiler, or having special properties making it desirable in the manufacture of such beverages as beer and ale. Its purification may require a wide range of special processes ranging from chlorination to distillation. Accordingly, a suitable line of reading would be somewhat as follows:

Water
Water Supply
Water Purification
Water Works
Distillation
Filter and Filtration
Boiler
Boiling Point
Mineral Waters
Bottling

COMMON CHEMICALS.

In Industrial Chemistry there are a number of rather common chemicals, but with a vast economic importance, for they enter so largely into manufacturing that they are always in constant demand and use. A few of these groups may be studied at some length. Thus—Sulphur, whose mining, extraction and purification are all problems in chemical engineering, has a number of important compounds. of which the best known industrially are found in the accompanying list:

Sulphur
Sulphureted Hydrogen
Sulphuric Acid
Sulphurous Acid
Thiosulphuric Acid

Found widely in nature, SALT is an important substance and common salt or Sodium Chloride is used not only for food, but in the manufacture of Soda Ash, Sodium Carbonate, and other substances. Consequently, the articles

Sodium
Salt
Soda

should be read, it being noted that under these a number of Sodium compounds are treated.

The Chlorine industry involves the preparation of substances used extensively in the arts as a bleaching or oxidizing agent, and the liquid chlorine in addition has been employed extensively as an asphyxiant in the great European War. See:

Chlorine
Chloric Acid
Chlorites
Chlorimetry
Hydrochloric Acid
Hypochlorous Acid
Sal Ammoniac
Mercuric Chloride
Mercurous Chloride
Bleaching Powder
Chloridizing
Chlorination

The various compounds of calcium supply to the arts a large number of important materials, including MARBLE and other BUILDING STONES, LIMESTONE for iron and lead smelting, GYPSUM or PLASTER OF PARIS (Lime Sulphate), CEMENT, in which Lime is the principal ingredient, BLEACHING POWDER or CHLORIDE OF LIME, MORTAR, in which Lime enters largely, and so on through an extensive list. In practically all of these purposes there is work for the industrial chemist, whether it involves the calcining of the material in a kiln to form cement or the study of concrete, now used so largely for structural work. Consequently, the reader who follows through the various articles on Calcium and its compounds as given below will realize their industrial importance:

Lime
Limestone
Marble
Building Stone
Marl
Chalk
Calcite
Iceland Spar
Gypsum (Lime Sulphate)
Bleaching Powder (Lime Chloride)
Cement
Kiln
Mortar
Concrete
Masonry
Plaster of Paris
Plaster, Lathing and Plastering
Calcium Carbide
Fertilizers
Manures and Manuring
Iron and Steel, Metallurgy of

The Destructive Distillation of wood affords a number of important products, among which is acetic acid, largely used in the manufacture of acetates. There are also a number of other or related substances, so that if we examine a rather broad group we find a number of valuable materials included. These may be embraced in the following list:

Distillation
Acetic Acid
Acetine
Methyl Alcohol
Tar

The Destructive Distillation and other treatment of bones also affords useful chemical products. The use of bone products as fertilizers, the employment of bone black as a decolorizing agent in filtration, as in sugar refining, are specially important. The connection tissue in skin and bones is used in making gelatine, and the bones themselves are employed in making glue. Accordingly, if the articles enumerated below be consulted a substantial idea of this field of chemical technology will be gained:

Bone
Bone Black
Bone Fertilizers
Gelatin
Glue

The industrial chemist has important work in connection with the manufacture of various artificial fertilizers which modern intensive agriculture demands. Naturally, this branch is closely connected with scientific agriculture and agricultural chemistry. Consequently, one will find in the accompanying list of articles much that will indicate how the chemist is assist-

ing the processes of nature. Such articles would be:

Manures and Manuring
Bone Fertilizers
Peat
Ashes
Phosphate
Potash
Kelp
Cyanamid

INORGANIC INDUSTRIES.

In Industrial Chemistry the great division of inorganic and organic chemistry can be observed in considering the products of various industries. A certain number containing various groups have been entered specifically on these lists, but the main topics involved can be indicated together and then the reader can pursue his investigations further, depending both on the list in this Guide and on the elaborate cross references given with the articles. Under Inorganic Chemistry reference profitably can be made to the following main and more prominent articles:

Sulphur
Sulphuric Acid
Salt
Hydrochloric Acid
Soda
Sodium
Chlorine
Nitric Acid
Ammonia
Potash
Bromide
Iodine
Phosphorous
Boric Acid
Arsenic
Oxygen
Peroxides
Sulphates
Alum
Cyanides
Carbon
Carbon Disulphide
Carbon Monoxide

MINERAL COLORS.

An important series of industries in Inorganic Chemistry involve the manufacture of pigments. The various chemicals entering into the more important of the pigments are discussed largely under MINERAL COLORS and separately as follows:

White:
White Lead
White Chalk
Lithopone
Gypsum
China Clay

Blue:
Ultramarine
Smaltite
Copper Indigo

Green:
Ultramarine
Brunswick Green
Chrome Green
Malachite Green
Verdigris
Paris Green

Yellow:
Chrome Yellows
Cadmium
Litharge
Gamboge
Indian Yellow or Purree

Orange:
Chrome Orange

Red:

- Red Lead
- Chrome Red
- Red Ochre
- Vermilion
- Realgar
- Antimony Red
- Carmine

Brown:

- Umber
- Sepia

Black:

- Lampblack
- Bone Black
- Charcoal
- Graphite

ORGANIC INDUSTRIES.

Industrial Chemistry is so closely connected with manufacturing and manufacturing processes that in any classification such as could be observed in an encyclopædia, it is very difficult to draw any satisfactory line of demarkation. Particularly is this the case in the large number of industries where organic chemistry plays an important part and underlies the various processes of manufacture.

Accordingly, the reader should refer to the chapter on MANUFACTURES AND ENGINEERING, where, under these various industries and products often the chemical technology is discussed. Such a list of organic industries would be as follows:

- Distillation
- Gas, Illuminating and Fuel
- Coal Tar
- Coal-Tar Colors
- Mineral Oils
- Petroleum
- Waxes
- Fats
- Oils
- Soap
- Candle
- Glycerine
- Gums
- Resins
- Starch
- Dextrin
- Glucose
- Sugar
- Fermentation
- Distilled Liquors
- Beer
- Brewing
- Explosives
- Fibres
- Dyeing
- Paper
- Leather
- Glue

MINERAL OILS.

The preparation and refining of Mineral Oils has produced a wealth of materials aside from the fuel oils proper, and one interested in this field after reading the comprehensive discussion on PETROLEUM will turn to other articles dealing with allied topics, as contained in the accompanying list:

- Petroleum
- Naphtha
- Paraffin
- Petrolatum
- Vaseline
- Shale Oil
- Ozokerite
- Mineral Tallow
- Asphalt

Chapter 20. Home Economics and Domestic Science

IT is but natural that the modern tendency to secure increased efficiency and, consequently, increased comfort and convenience should be manifested in the home through the application of scientific management and devices no less than in commerce and industry. In its latest aspects this finds full expression in the NEW INTERNATIONAL ENCYCLOPÆDIA. Modern science has done much for the housekeeper, securing more nourishing and more economical foods, as well as as various labor-saving devices—such as SEWING MACHINES and VACUUM CLEANERS—that materially cut down the effort necessary to maintain and operate a domestic establishment. This concerns the small as well as the large householder, for electric light, gas heating and plumbing are all but universally found, and economic methods have been devised for the small city apartment or the isolated farm whereby the maximum well-being, comfort and economies generally can be obtained.

Modern *home economics* is not concerned alone with Food and its Preparation. The intelligent woman of to-day, managing a home, often arranges for its building, for the carpentry, heating, plumbing, wall paper, furniture and carpets and rugs, or for its lease if a rented dwelling, or a portion of an apartment house or hotel. If sufficiently large, the dwelling may involve electric heating, including electric cooking, vacuum cleaners or laundry machines, and in many of the modern homes may involve an organization as complex as a small business, and this involves a number of employees—male and female—to whom the principles of Master and Servant must apply. In a large part, however, Domestic Science has to do with food and its preparation, for it is here that the chemistry of nutrition has been brought to bear, and the wholesome and economical preparation of food is one of the main objects of the modern science of Household Chemistry.

Considering, therefore, the articles already suggested and others arranged in a convenient list for ready reference, we should have first the following, dealing with the home and its material equipment:

House
Apartment House
Tenement House
Hotel
Building
Carpentry
Heating and Ventilation
Plumbing
Electric Heater
Electric Lighting
Lighting
Illumination
Vacuum Cleaner
Water Supply
Filter and Filtration
Laundry Machinery
Sewage Disposal

On the legal side, the householder should know something of the law dealing with such subjects as:

Deed

Title
Lease
Master and Servant

Supplied with a proper house and concerned with its management or with the management of an institution where features of home life and home conveniences must apply, one would be concerned with the articles on

Home Economics
Management, Home and Institution
Coöperation
Marketing Associations, Agricultural

It is, however, on food and food supply that intelligent interest centers, for it is here that the high cost of living first makes itself apparent, not to mention that the appetite may prove the shortest road to a man's well being if not to his mind. One concerned with modern scientific food studies realizes that chemistry and physiology figure actively, so that a range of articles are available that are indeed comprehensive.

Food
Fish as Food
Diet
Digestion
Nutrition
Infants, Feeding of
Cookery
Baking
Baking Powder
Fireless Cooker
Food Preservation
Sterilized Food
Packing Industry
Slaughterhouse
Adulteration
Pure-Food Law

Prepared by the preceding rather general articles on Foods and Food-Stuff, the reader in this department will be ready to take up specifically a number of classes of Foods, or, in some cases, definite food substances. Such a list would include the grains and their products:

Barley
Buckwheat
Rye
Wheat
Maize
Rice
Flour
Bread

There would also be such important foods as

Milk
Cream
Butter
Butter Color
Butter Making
Oleomargarine
Cheese
Eggs
Meat
Meat Extract
Nuts
Fruits
Vegetables

Chapter 21. Interior Decoration and Decorative Art

WITHIN a few years there has developed in connection with, yet at the same time apart from, architecture and the fine arts increased interest in those æsthetic forms of expression that are found in the home or dwelling. While always recognized on its artistic side, home decoration has now become a practical art requiring systematic training on the part of those by whom it is practised, and having secured for itself general public recognition as distinct from architecture or mere trade activity in the supply of the articles necessary for the home.

With the growth of civilization the decoration of the home, be it a hut, cave, cottage, or palace, has always appealed directly to its owner or occupants, and their taste has found expression in combining beauty with utility. As a result there is to be seen decorative activity ranging from a most humble scale to securing the work of the greatest artists of the period for ornamental purposes. It is only recently that the proper and most advantageous uses of articles of decorative value have been recognized, and with the growth of luxury and comfort there has been, on the whole, a corresponding growth in good taste. In large part, this has been due either to artist, craftsmen of rare talents or to those who have studied the various æsthetic elements involved in house decoration, recognizing the cardinal principle that a home is designed for habitability. From such study encouraged by museums and collections there has grown up a school of decorative art known as interior decoration, which aims to cultivate public taste to appreciate the artistic and to make the home conform to the accepted canons of good taste, where the work not only of artists but of skilful craftsmen and artisans will be appreciated.

This movement involves both a general manifestation of progressively better taste and the activities of those trained professionally in schools of fine arts or design to practice the art of interior decoration and to advise persons who need such assistance. Just as the ordinary person requires the service of an architect to design or remodel a house or apartment, so when its decoration and furnishing are involved there is no less a call for the services of a trained interior decorator, rather than a mere painter, upholsterer or tradesman. To this profession many women, as well as men, are now devoting themselves with marked success, and to learn of their training and their work one can turn to the article on INTERIOR DECORATION. Here will be found, also, a broad view of the development and scope of the modern art, and if read in connection with the more formal article on DECORATIVE ART, with attention also to ORNAMENT and ARCHITECTURE, a good idea will be gained of the modern status of this important field. Naturally, there are subsidiary to it a number of subordinate articles—thus, FURNITURE is an important part of Interior Decoration, and in its development may be traced the

general progress of the beautiful with the practical, though retrogression in taste unquestionably is to be noted with the increase of mechanical facility in production and otherwise. Likewise, in CARPETS and RUGS decorative impulse finds expression, and floor coverings represent a wide diversity of artistic ideas, depending upon their service, from the hand looms of the Orient to the modern carpet factory. Again, in the decoration of the surfaces of walls from the older tapestries to the WALL PAPER of the day, a distinct artistic development is represented. In TEXTILE PRINTING also modern art has brought about a wide range of decorative material for the modest householder.

Therefore, with the citation of such main titles, a consideration of a somewhat fuller list will show the interrelation of the articles in this and allied departments, and how advantageously they fit into a comprehensive reading scheme. The list might be taken up in the following order:

Interior Decoration
Decorative Art
Ornament
Architecture
Mural Decoration
Painting
Sculpture
Illumination
Furniture
Chippendale Chairs
Chippendale, Thomas
Hepplewhite, George
Sheraton, Thomas
Boulle
Veneer
Wall Paper
Paper Hanging
Textile Printing
Tapestry
Gobelin
Carpet
Rug
Lamp
Lacquer Work
Pottery
Armor
Metal Work

Chapter 22. Geology

GEOLOGY covers a broad field. Its primary object is to explain the origin and development of the earth and the inhabiting life forms. It is concerned thus on the one side with inorganic nature—the character of the materials which constitute the earth's structure, the formation and classification of rocks, the forces of uplift that have produced mountains and continental lands, the agencies that work to modify surface features, the phenomena of earthquakes and volcanoes, and all processes of change operative from the beginning; in another aspect it is allied to the biologic sciences for which it endeavors to find an explanation for the present distribution of plants and animals in the evidences afforded by fossils which have been preserved in the superficial layers of the earth.

Because of its wide scope, geological science has been separated into a number of departments, each with its distinct formations, but none the less closely related to all the others. Of fundamental importance is Petrology, the branch which considers the nature of rocks and the methods of their origin. This branch is one of the last to have attained a real scientific basis. The arrangement of the rocks as they appear at the surface—often quite different from their original attitudes—and the significance of the arrangement in relation to past events, constitute the subject matter of Structural Geology. The great changes which have taken place and are still in progress belong to the field of Dynamical Geology, which considers the action of the atmosphere, water, igneous activity and crustal strains in modifying the earth's features. Its study is essential to the proper understanding of physical geography, particularly the modern development of that subject known as physiography. Consequently the references to physiographic articles will be included under its head. Stratigraphical Geology has for its particular province the investigations of the order and chronological classification of the strata and the study of the geography of the earth in past ages. It has a valuable adjunct in Paleontology, which is the study of fossils and their interpretation in the light of evolution. Geology has many practical bearings, and its application to mining, agriculture and engineering is considered under the head of Economic Geology.

We shall now guide the reader to the articles relating to those several divisions of the subject. For the general article, see GEOLOGY.

A. Petrology

For the more comprehensive articles in this field, see:

Petrology
Mineralogy
Crystallography
Rock

The various large groups or classes of rocks are described under the following titles:

Igneous Rocks
Aqueous Rocks
Æolian Accumulations
Clastic Rocks
Plutonic Rocks
Metamorphic Rocks
Crystalline Rocks
Arenaceous Rocks
Argillaceous Rocks
Calcareous Rocks

For the more important specific kinds of rocks, see:

1. Igneous (Massive) Rocks:

Granite
Rhyolite
Porphyry
Syenite
Trachyte
Phonolite
Diorite
Dacite
Felsite
Gabbro
Pyroxenite
Hornblendite
Peridotite
Diabase
Basalt
Melaphyre
Felsite
Trap
Obsidian
Pitchstone
Lava
Tuff

2. Sedimentary (Stratified) Rocks.

(*a*) *Mechanical Sediments:*
Sand
Gravel
Sandstone
Conglomerate
Breccia
Clay
Shale
Silt
Loess
Boulder Clay
Drift

(*b*) *Chemical Sediments:*
Limestone
Dolomite
Travertine
Gypsum
Salt
Geyserite
Bog-Iron Ore
Clay Ironstone

(*c*) *Organic Sediments:*
Limestone
Coquina
Chalk
Coral
Marl
Diatomaceous Earth
Phosphate Rock
Peat
Lignite
Coal

3. Metamorphic (Foliated) Rocks:

Marble
Quartzite
Slate
Schist
Gneiss
Amphibolite
Mica Schist
Eclogite
Serpentine
Talc
Soapstone
Chlorite Schist

B. Structural Geology

The broader features of geological structure are described in the articles:

Bed
Formation
Conformity
Unconformity
Laccolite
Batholite
Boss
Dike
Sill
Veins

The smaller elements of structure which pertain to the above larger forms are explained in the articles:

Joints
Foliation
Lamination
Schistosity
Stratification

The effects of uplift and disturbance upon rocks are described in the articles:

Continent
Mountain
Anticline
Syncline
Monocline
Dip
Strike
Fault
Clinometer

C. Dynamic Geology and Physiography

The general subject of dynamic agencies operative within the earth is discussed in the articles:

Crust of the Earth
Elevation and Subsidence
Metamorphism
Cataclysm
Volcano
Earthquake
Geyser
Refrigeration of the Earth

For the evolution of the topography of the earth's surface, see:

Physiography
Erosion
Continent
Island
River
Valley
Plateau
Lake
Glacier
Glacial Period

D. Stratigraphical Geology

The rocks composing the outer solid structure of the earth are separated according to their position and relative age into large divisions which are designated as groups. Each group represents a long interval of time or era during which the strata were accumulated. The different groups and

their corresponding eras are described under:

Archeozoic Era
Proterozoic Era
Paleozoic
Mesozoic Era
Cenozoic

These main divisions are further subdivided into systems, or, according to the time element, into periods. The several systems are described in the following articles:

1. *Archeozoic and Proterozoic:*

Pre-Cambrian Formations

2. *Paleozoic:*

Cambrian System
Ordovician
Silurian System
Devonian System
Carboniferous System
Permian System

3. *Mesozoic:*

Triassic System
Jurassic System
Cretaceous System

4. *Cenozoic:*

Tertiary System
Quaternary System

The broader scheme of classification as outlined above is of general application. Further subdivision becomes necessary in the study of particular areas, for the individual strata change in character and often in fossil content, as they are traced from place to place. To identify the minor units, geologists usually employ local names which have currency only within a single country or among such countries as have very similar stratiographic development. Some of the more important minor divisions in the United States are described in the articles:

Pre-Cambrian:

Keweenawan Series

Cambrian:

Potsdam Sandstone

Ordovician:

Calciferous
Trenton
Hudson River Beds

Silurian:

Medina Series
Clinton Stage
Niagara Series
Salina Stage

Devonian:

Oriskany
Lower Helderberg
Chemung Formation
Catskill Formation

Carboniferous:

Millstone Grit
Pottsville Conglomerate
Burlington Limestone

Triassic:

Newark Series

Jurassic:

Liassic
Oolite

Cretaceous:

Potomac Formation
Dakota Stage
Niobrara Stage
Laramie Stage

Tertiary:

Eocene Epoch
Oligocene Epoch
Miocene Epoch
Pliocene Epoch

Quaternary:

Columbia Series
Drift
Glacial Period
Recent Period

E. Paleontological Geology

Paleontology is the study of the nature and distribution of the life forms imbedded in the rocks of the earth's crust. Viewed from the standpoint of biological science, it is a part of zoology and botany; but it is so intimately connected with the study of the rocks themselves that it may properly be considered a part of geology. The general articles on the subject are:

Paleontology
Paleobotany
Fossil
Fossiliferous Rocks
Contemporaneity
Homotaxy
Ichnology
Fossil Forests

From a biological point of view, the proper method of classifying fossil forms would naturally follow the same principles that guide the classification of living plants and animals. But in studying paleontology as a part of geology, the geological classification is preferable; indeed, the two systems would, to a certain extent, coincide. We shall, therefore, refer the reader to the characteristic fossils of each geological epoch. Most of the larger classes and orders of fossil forms are still represented by living species, and general discussions of these classes will be found in the articles given in the chapters on Botany and Zoology.

1. The only fossils found in the Pre-Cambrian Formation are described in the article ANTIKOKANIA:

2. CAMBRIAN FOSSILS:

(*a*) *Plants:*
Oldhamia

(*b*) *Animals:*
Protospongia
Dictyonema
Agnostus
Paradoxides
Dikellocephalus
Olenellus
Trilobita
Lingula
Obolella
Hyolithes
Nautiloidea

3. ORDOVICIAN AND SILURIAN FOSSILS:

(*a*) *Invertebrates:*
Brachiospongia
Stromatopore
Graptolite
Monograptus
Favosites
Olenus
Chonetes
Asaphus
Polyzoa

Fenestella
Atrypa
Orthis
Spirifer
Pentamerus
Bellerophon
Pteropoda
Orthoceras
Tentaculites
Eurypterus

(*b*) *Fishes:*
Pteraspis
Cyathaspis

4. Devonian Fossils:

(*a*) *Invertebrates:*
Atrypa
Cyathophyllum
Phacops
Ammonoidea
Pleurotomaria
Murchisonia
Clymenia
Goniatites
Bactrites
Heliophyllum

(*b*) *Fishes:*
Holoptychius
Osteolepis
Dipterus
Coccosteus
Dinichthys
Cephalaspis
Chirolepis

5. Carboniferous Fossils:

(*a*) *Plants:*
Neuropteris
Calamites
Asterophyllites
Annularia
Lepidodendron
Sigillaria
Stigmaria
Cordaites
Carpolith
Trigonocarpus

(*b*) *Invertebrates:*
Fusulina
Chonetes
Productus
Proetus
Eurypterus

(*c*) *Fishes:*
Megalichthys
Cestraciont

(*d*) *Reptiles:*
Stegocephalia

6. Permian Fossils:

(*a*) *Fishes:*
Palæoniscus

(*b*) *Reptiles:*
Rhynchocephalia

7. Triassic Fossils:

(*a*) *Plants:*
Equisetum
Cycadaceæ

(*b*) *Invertebrates:*
Terebratula
Ceratites
Ammonites

(*c*) *Reptiles:*
Mastodonsaurus
Theromorpha
Dinosauria
Anchisaurus
Labyrinthodon
Dicynodon

(*d*) *Mammals:*
Microlestes
Microconodon

8. Jurassic Fossils:
(*a*) *Invertebrates:*
Gryphæa
Trigonia
Belemnites

(*b*) *Fishes:*
Chondrosteus
Hybodus

(*c*) *Reptiles:*
Teleosaurus
Ichthyosaurus
Plesiosaurus
Pterodactyl
Dimorphodon
Diplodocus
Megalosaurus
Brontosaurus
Stegosaurus
Titanosaurus
Cynognathus
Baptanodon
Camptosaurus
Ceratosaurus

(*d*) *Birds:*
Archæopteryx

(*e*) *Mammals:*
Ctenacodon

9. Cretaceous Fossils:
(*a*) *Invertebrates:*
Foraminifera
Globigerina
Ventriculites
Hippurites
Radiolites
Inoceramus

(*b*) *Reptiles:*
Chelonia
Iguanodon
Mosasauria
Elasmosaurus
Hadrosaurus

(*c*) *Birds:*
Bird, Fossil
Hesperornis
Ichthyornis

10. Eocene Fossils:
(*a*) *Invertebrates:*
Nummulites

(*b*) *Reptiles:*
Zeuglodon

(*c*) *Mammals:*
Coryphodon
Hyracotherium
Horse, Fossil
Palæotherium
Anchitherium
Anoplotherium
Lophiodon
Creodonta

11. Miocene Fossils:
(*a*) *Mammals:*
Mastodon
Dinotherium
Helladotherium
Machærodus
Elotherium
Halitherium
Hyracodon
Oreodon
Titanotherium

12. Pliocene Fossils:

(*a*) *Plant:*
Dæmonelix

(*b*) *Mammals:*
Sivatherium

Hipparion
Sabre-Toothed Tiger

13. Quaternary Fossils:

(*a*) *Birds:*
Æpyornis
Moa

(*b*) *Mammals:*
Elasmotherium
Megatherium
Glyptodon
Diprotodon
Mammoth
Mastodon
Pithecanthropus

F. Economic Geology

This department considers the application of geological facts and principles to industry and technology. The service of geology to mining is especially important and has been recognized very generally by the organization of public surveys to furnish information about the occurrence and distribution of the mineral resources. With this function is usually combined the study of underground waters, a branch that has gained prominence quite recently through the development of the arid tracts of the western United States. Geology also affords useful guidance in the conduct of engineering construction, and of course is the basis for the investigation of the formation and distribution of soils.

The mineral materials that find employment in the arts or industry are of great variety and exhibit wide differences in their methods of occurrence. Some are used in the form in which they exist in nature, or require only a mechanical process of purification or preparation. Such are exemplified by building stones and coal. A large class of minerals, however, have no value in their natural state, but contain valuable elements that can only be released by some metallurgical or chemical treatment. They are illustrated by the compounds containing metals, which in their natural state are called ores. The mode of occurrence of the ores, as well as of the non-metalliferous minerals, is the proper field of study of Economic Geology, while the methods employed in their production belong to Mining and Metallurgy.

I. The forms and occurrence of the larger rock masses have already been referred to under Petrology and Structural Geology. The other non-metallic substances will be described in the articles on each specific substance. It is, therefore, only necessary to give as introductory articles those descriptive of the occurrence of the ores. See:

Ore
Ore Deposits
Gangue
Footwall
Hanging Wall
Pinch
Dike
Vein
Lode

II. The Metalliferous Ores:

1. *Iron Ores:*
Limonite
Hematite
Magnetite

Siderite
Franklinite
Bog-Iron Ore
Blackband Ironstone
Pyrite
Pea Ore

2. *Gold Ores:*
Gold
Calaverite
Hessite

3. *Platinum*

4. *Silver Ores:*
Silver
Argentite
Pyrargyrite
Cerargyrite
Proustite
Stephanite

5. *Copper Ores:*
Chalcopyrite
Cuprite
Malachite

6. *Lead Ores:*
Galena
Anglesite
Cerusite
Pyromorphite

7. *Zinc Ores:*
Blende
Willemite
Zincite
Franklinite
Smithsonite
Calamine

8. *Mercury Ores:*
Cinnabar
Calomel

9. *Manganese Ores:*
Pyrolusite
Manganite
Psilomelane

10. *Aluminum Ores:*
Cryolite
Gibbsite
Bauxite

11. *Tin Ore:*
Cassiterite

12. *Nickel Ores:*
Millerite
Pyrrhotite

13. *Antimony Ore:*
Stibnite

III. The Carbon Minerals:

1. Coal
Anthracite
Bituminous Coal
Jet
Lignite
Torbanite
Peat

2. Petroleum
Gas, Natural

3. Asphalt
Bitumen
Albertite
Grahamite
Gilsonite
Maltha

4. Ozocerite
Asphaltic Coal
Mineral Tallow

5. Graphite

IV. Building Materials:

Building Stone
Granite
Sandstone

Limestone
Freestone
Marble
Onyx Marble
Flagstone
Caithness Flagstone
Slate
Bath Stone
Caen Stone
Brownstone
Puzzuolana

V. Soils, Clays, Fertilizers, and Waters:

1. Humus
   Soil
   Loam
   Loess
2. Clay
   Potters' Clay
   Fire Clay
   Pipe Clay
   Brick Clay
   Kaolin
3. Gypsum
   Apatite
   Phosphorite
   Marl
   Guano
4. Mineral Waters
   Spring
   Artesian Wells

VI. Salts:

Salt
Bay Salt
Borax
Bromine
Iodine

VII. Precious Stones:

Diamond
Corundum
Quartz
Emerald
Ruby
Beryl
Chrysoberyl
Sapphire
Aquamarine
Tourmaline
Spodumene
Amethyst
Opal
Alabaster
Chalcedony
Carnelian
Sardonyx
Aragonite
Agate
Jasper
Chrysolite
Turquoise
Topaz
Garnet
Rhodonite
Chrysocolla
Catlinite
Benitoite
Smithsonite

VIII. Abrasives:

Abrasives
Diamond
Grindstone
Buhrstone
Oil-Stone
Novaculite
Emery
Corundum
Carborundum
Garnet
Diatomaceous Earth
Tripolite
Pumice

IX. Pigments:
- Mineral Paints
- Graphite
- Ochre
- Umber
- Burnt Sienna
- Chalk
- Hematite
- Slate

X. Minerals Used in Various Arts:
- Lithographic Stone
- Solenhofen Lithographic Stone
- Talc
- Soapstone
- Mica
- Feldspar
- Fluorite
- Sulphur
- Asbestic
- Asbestos
- Magnesite
- Fuller's Earth
- Monazite

G. Biographies of Eminent Geologists

Barrande, J.
Beyrich, H. E. B.
Bishop, K. G.
Brongniart, A.
Buch, L. von
Buckland, W.
Chamberlin, T. C.
Conybeare, W. D.
Cope, E. D.
Cotta, B. von
Dana, J. D.
Darwin, Charles
Daubrée, G. A.
Dawson, Sir J. W.
De la Beche, Sir H. T.
Elie de Beaumont, J. B.
Eichwald, K. E.
Emmons, E.
Forbes, J. D.
Gaudry, A.
Geer, G. de
Geikie, Sir Archibald
Goldfuss, G. A.
Hall, Sir James
Hall, James
Hayden, F. V.
Heer, O.
Heim, A.
Hitchcock, E.
Humboldt, F. H. A. von
Hutton, J.
Koninck, L. G.
Lapparent, A. A. C. de
Lea, I.
Le Conte, J.
Logan, Sir William
Lyell, Sir Charles
Marcou, J.
Marsh, O. C.
Miller, H.
Mojsisovics, E. von
Murchison, Sir R. I.
Newberry, J. S.
Orbigny, A. D. d'
Owen, Sir R.
Phillips, J.
Playfair John
Powell, J. W.
Prestwich, Sir Joseph
Ramsay, Sir A. C.
Roemer, F. A.
Rosenbusch, H.
Saussure, H. B. de
Schimper, W. P.
Sedgwick, A.
Silliman, B.

Smith, W.
Sowerby, J.
Strickland, H. E.
Suess, Eduard
Unger, F.
Werner, A. G.
Winchell, A.
Woodward, S. P.
Zittel, K. A. von

Chapter 23. Meteorology

METEOROLOGY is the study of the atmosphere, its static conditions and appearances, and the changes and movements of all kinds which take place in it. The two principal constituents of the atmosphere are the air and the moisture in various forms which the air holds in suspension. Weather and climate are principally determined by the conditions under which these two constituents exist, at any particular time or habitually. The static conditions of the air which mainly affect the weather are its temperature and its pressure; its movements come under the general term wind. The moisture of the atmosphere, unlike the bulk of the air, is continually changing its identity. It is raised from surface waters by evaporation, held for a time in suspension under various forms, and then returned to the earth's surface by various modes of precipitation.

Besides these two sets of phenomena, the electrical conditions of the atmosphere form an important element of the weather. Other causes sometimes bring about peculiar or unusual weather conditions, and, aside from weather in its strict sense, meteorology takes cognizance of the peculiar optical appearances which the atmosphere presents. These considerations, together with the fact that the practical aspects and practical rather than theoretical investigations hold, perhaps, a more prominent place in meteorology than in other natural sciences, serve to indicate the main divisions of the subject. A considerable number of instruments are used in meteorological investigations, and the articles describing these will be referred to in connection with the appropriate subdivision.

I. General Principles of the Science. See:

Meteorology
Atmosphere
Polarization of Sky Light
Dust
Climate
Weather

II. Temperature and Pressure.

1. The theory and investigation of temperature and its causes are treated under:

Temperature, Terrestrial
Cold Wave
Frost
Snow Line
Actinometry
Thermometry
Seasons

2. The instruments used in measuring temperature and radiation are described under:

Thermometer
Actinometer
Actinograph
Radiometer
Pyrheliometer

3. For atmospheric pressure and the instruments used in measuring it, see:

Barometer

III. Winds.

1. There are certain general forms of wind movements recognized without reference to localities. See:

Wind
Storm
Whirlwind

Tornado
Waterspout
Gale

2. On the other hand, in certain parts of the world peculiar local conditions produce winds which have received local names. See:

Doldrums
Calm Latitudes
Blizzard
Chinook
Etesian Winds
Harmattan
Hurricane
Mistral
Sirocco
Monsoon
Simoom
Equinoctial Storm

3. For the instruments and methods used in measuring or observing the winds, see:

Anemometer
Anemograph
Anemoscope
Beaufort Scale

IV. Evaporation and Precipitation.

1. See the general article:

Evaporation

2. The various forms in which moisture is held suspended are described under:

Humidity
Haze
Fog
Cloud

3. For the various forms of precipitation, see:

Dew
Hoar Frost (under Frost)
Rain
Cloudburst
Snow
Hail

4. For the instruments used in measuring or observing the moisture of the atmosphere, see:

Hygrometer
Drosometer
Nephoscope
Rain Gauge

V. Electrical Conditions Affecting the Weather. See:

Atmospheric Electricity
Lightning
Lightning, Accidents from
Lightning, Protection from

VI. Peculiar or Unusual Weather Conditions are Described in the Articles:

Dust
Dark Day
Black Rain
Blood-Rain
Indian Summer

VII. Other Phenomena of the Atmosphere Belong Mainly to Optical Appearances or Electrical Displays. See:

Rainbow
Fog-Bow
Halo
Scintillation
Mirage
Fata Morgana
Aurora Borealis
Elmo's Fire, Saint
Castor and Pollux

VIII. Practical Investigations in Meteorology are Generally Conducted by Government Bureaus. See:

Weather Bureau
Signal Corps, U. S. Army

These bureaus warn the public by a system of signals. See:

Storm and Weather Signals

And in this connection also:

Fog Signals

They also issue daily weather maps. See:

Isothermal Lines
Isobarometric Lines
Isograms
Isabnormal Lines
Isanomalous Lines

IX. For Biographies of the Most Prominent Meteorologists, see:

Abbe, Cleveland
Espy, James Pollard
Fonvielle, Wilfrid de
Maury, M. F.
Pernter, J. M.
Wild, H.

Chapter 24. Geography

GEOGRAPHY is the description of the surface of the earth in all its aspects. Just as the place where the atmosphere is where the lithosphere meets the hydrosphere, so do the sciences of METEOROLOGY and GEOLOGY meet in that of GEOGRAPHY, and the last to a certain extent encroaches upon the fields of the other two. The subject is very wide, covering a regional study of the upper layers of the earth's crust, a regional study of the atmosphere, or the climatic conditions prevailing on the various parts of the surface. Thus, in the consideration of any region on the earth, we should study the character of the land configurations, the bodies of water (rivers, lakes, seas, etc.) and their influences, the flora and fauna and their relationship to the other physical features, and, finally, the human inhabitants, their character and activities. Of course, we should also consider region as a whole and its relationship to other parts of the earth.

The whole subject may be broadly divided into three main branches: Mathematical Geography, which deals with the form, dimensions, and position of the earth, and the methods of its delineation; Physical Geography, which is a general discussion of the various natural features of the earth's surface, and Political, Regional, or Descriptive Geography, which gives detailed and specific descriptions of the separate parts of the earth's surface, generally as its human inhabitants have divided it among themselves, all their varied activities, and all the artificial changes which they have made, and the structures which they have built.

A. Mathematical Geography

I. GENERAL. See:

- Earth
- Pole
- Equator, Terrestrial
- Meridian
- Latitude and Longitude
- Degree of Latitude
- Degree of Longitude
- Tropics
- Geography
- Zone

II. METHODS OF DELINEATION. See:

- Map
- Chart
- Globe
- Coast and Geodetic Survey
- Geodesy
- Surveying

III. TERRESTRIAL MAGNETISM. See:

- Magnetism, Terrestrial
- Declination
- Dip
- Isoclinic
- Isogonic Lines
- Isodynamic Lines
- Compass
- Theodolite
- Sextant

B. Physical Geography

Under this head will be given the articles dealing with geographical features that are due to various geological or climatic causes. The articles on the causes themselves are referred to under Geology and Meteorology. At the end of each subdivision are given the articles on the most remarkable examples of the features discussed. In connection with this section the departments of Zoölogy and Botany should also be consulted.

I. General Article. See:
- Physiography

II. Oceanography:
- Oceanography
- Ocean
- Deep-Sea Exploration
- Sounding
- Abysmal Accumulations
- Oceanic Deposits
- Ocean Currents
- Tides
- Bore
- Channel
- Shore
- Gulf Stream
- Atlantic Ocean
- Pacific Ocean
- Indian Ocean

III. General Land Forms:
- Aiguille
- Archipelago
- Butte
- Cordillera
- Continent
- Island
- Isthmus
- Mountain
- Valley
- Plateau
- Sierra
- Basin
- North America
- Australia
- Himalaya
- Malay Archipelago
- Panama, Isthmus of
- Sierra Nevada

IV. Hydrography:
- Hydrography
- Bayou
- Bog
- River
- Divide
- Waterfall
- Inundation
- Flood Plain
- Delta
- Reef
- Bar
- Lake
- Floating Island
- Mississippi River
- Amazon River
- Nile
- Great Lakes

V. Geographical Features Due to Movements of the Earth's Crust:
- Beaches, Raised
- Earthquake
- Estuary
- Fiord
- Coastal Plain
- Great Rift Valley

VI. Features Due to Volcanic Action:
- Volcano
- Crater

Geyser
Dike
Laccolote
Vesuvius
Etna (Ætna)
Krakatoa
Pelée, Mont
Hecla
Mauna Loa
Kilauea
Soufrière, La
Popocatepetl
Yellowstone National Park
Palisades
Giant's Causeway
Staffa

VII. Features Due to Erosion:
Erosion
Piedmont Plain
Bad Lands
Cliff
Talus
River Terraces (under Terrace)
Cañon
Mesa
Sink Hole
Cave
Karst
Delaware Water Gap
Colorado River
Niagara River and Falls
Victoria Falls
Mammoth Cave
Luray Cave
Natural Bridge
Yosemite Valley

VIII. Features Due to Glacial Action:
Glacier
Moraine
Iceberg (under Ice)
Avalanche
Drumlin
Eskers
Giants' Kettles
Rocking Stones
Mer de Glace
Gorner Glacier

IX. Features Due to Wind Action:
Dune
Medano
Musical Sand

X. Features Due to Peculiar Soil or Climatic Conditions:
Desert
Oasis
Prairie
Savannas
Steppe
Tundra
Downs
Llanos
Pampas
Karroo
Sahara
Gobi

XI. Features Due to the Action of Animals:
Coral Island
Atoll
Barrier Reef

C. Political or Regional Geography

This is by far the most important part of geographical study, and, taken as a whole, is probably the largest and most valuable department of the New International Encyclopædia. Lack of space makes it impracticable to enumerate all of the important articles in the work connected with a study of Political Geography. The next best thing would be an outline of geograph-

ical history and knowledge, which would of itself suggest further fields of investigation.

The earliest geographic knowledge dates back to about 600 B. C. Hecataeus was one of the first cartographers, and at about 500 B. C. made a map of the world as known then, showing the existence of two continents. Herodotus distinguished three continents, Aristotle demonstrated that the world was round, and Eratosthenes computed the length of the earth's circumference to be 25,000 miles. Ptolemy extended the knowledge of the world by a vast amount and drew maps that were used by Columbus over thirteen centuries later.

In the line of exploration, the Phœnicians were the first nation of discoverers. With the Carthaginians and the Egyptians their trading brought them into many unknown regions, which they frequently colonized. The Arabs contributed a large amount of geographic knowledge during the Middle Ages and the Norsemen colonized Iceland and Greenland and explored the northern seas.

The names connected with geographical knowledge up to the fifteenth century, when the period of modern explorations began, are in the following list:

I. ANCIENT:

- Hecatæus of Miletus
- Herodotus
- Eratosthenes
- Pythagoras
- Ptolemy
- Aristotle
- Strabo
- Tyre
- Pytheas of Marseilles
- Alexander the Great
- Masudi
- Edrisi
- Ibn Batuta
- Ericson, Lief
- Benjamin of Tudela

II. MEDIÆVAL:

- Rubruquis
- Polo, Marco
- Clavijo
- Conti, Niccolò dei

Modern exploration dates from the fifteenth century, particularly from the time of Prince Henry of Portugal. The discovery of the Cape of Good Hope and the utilization of the magnetic compass lent impetus to the navigation of the high seas and consequent discoveries. These were at first confined to Africa, in a search for an all-water route to India. Then came Columbus, who discovered the West Indies (America). This marked the beginning of a series of discoveries that resulted in the uncovering of the entire Western Hemisphere and the establishment of the main features of the globe on both land and sea. With this accomplished, the attention of the world turned to the opening up and development of the newly discovered lands. North and South America, Africa, Asia, Australia, and many of the Pacific Islands were all fields of endeavor in the search for growth of trade and wealth. Many places were discovered and explored by men of different countries and disputes frequently arose over their possession. All of the maritime nations, particularly Portugal and Spain, took part, the names of hundreds of men finding their way into the annals of history.

In the following list are men prominent in early exploration and discovery. The names will suggest articles on the regions explored and other places affected.

Men and places involved in early discovery and exploration:

I. South America:

Pizarro, Francisco
Drake, Sir Francis
Hawkins, Sir Richard
Magalhães, Fernão de

II. North America:

Columbus, Christopher
Vespucius, Americus
Cabot, John
Cabot, Sebastian
Balboa, Vasco Nuñez de
Cortés. Hernán
Soto, Hernando de
Cartier, Jacques

III. Africa:

Cadamosto
Días de Novæs, Bartholomeu
Gama, Vasco da
Henry the Navigator

IV. South Sea and Pacific Ocean:

Tasman, Abel Janszoon
Cook, Capt. James
Entrecasteaux, Joseph Antoine
Bruni, Chevalier d'

Exploration in Africa, at first entirely confined to the Portuguese, became the attention of other nations toward the end of the 18th century, when James Bruce, an Englishman, seeking the source of the Nile, discovered the Blue Nile. He heads a very long list of African explorers, more prominent among whom are Mungo Park, Heinrich Barth, David Livingstone, H. M. Stanley, Gerhard Rohlfs. There are still parts of this continent, South America and Asia, which are quite unknown. These are slowly being uncovered by men who are accomplishing difficult and arduous tasks with little or no glory.

The main attention of the world in modern times has been directed toward the explorations of the Polar Regions. At first actuated by purely commercial incentives, the efforts of explorers today are directed in the interest of science. The earliest explorations in the North Polar regions, however, were caused by the search for the Northwest Passage to the Orient. The men prominently connected with this in particular were the Cabots, Henry Hudson, Parry, Cook, Rae, Simpson, Franklin and McClure. The Antarctic has received less attention than the northern fields on account of its remoteness, and it is only recently that any valuable work has been done there. In this connection Shackleton, Scott and Amundsen stand out prominently among the few South Polar explorers.

Recent successes in the Polar Regions are directly attributable to the lessons learned in early work there and to the advance in scientific knowledge, which gave to the men advantages never had by early explorers. Both Poles have finally been attained, the North Pole by Peary (April 6, 1909), and the South Pole by Amundsen (December 4, 1911) and Scott (January 18, 1912). See articles Polar Research, Northwest Passage.

Polar Explorers. See:

Amundsen, R.
Back, G.

Baffin, W.
Barents, W.
Bering, V.
Cook, J.
Franklin, J.
Greely, A. W.
Hudson, H.
Kotzebue, O. von
McClure, R. J. le M.
Mawson, D.
Nansen, F.
Nordenskiold, N. A.
Parry, W. E.
Payer, S.
Peary, R. E.
Ross, J. C.
Ross, J.
Scott, R. F.
Shackleton, E. H.
Stefansson, V.
Sverdrup, O.
Vancouver, G.
Vilkitsky, B. A.
Wellman, W.
Weyprecht, K.
Wilkes, C.

Lack of space forbids anything like an enumeration of even the more important articles describing the various parts of the earth and their inhabitants. The bulk of minor gazetteer articles are intended only for incidental reference, when information about a particular locality is desired. Nevertheless, it would be possible to plan a very instructive and interesting course of systematic reading in descriptive geography.

One way would obviously be to read first the articles on the larger divisions of the earth, EUROPE, ASIA, AFRICA, AMERICA, AUSTRALIA, ARCTIC REGION, and ANTARCTIC REGION, and, in the latter connection, the article on POLAR RESEARCH. These articles give, besides, a general geographic and ethnographic description, and a history of exploration and discoveries from ancient to recent times. They also refer to the separate divisions of the larger land areas, and, by reference to the articles on these divisions, the reader will be carried successively into narrower and narrower fields with more and more detailed description.

The story of explorations and discoveries, and of the science of geography, may also be carried further by means of the following names and titles:

Andrée, S. A.
Baker, S. W.
Barth, H.
Behaim, M.
Borchgrevink, C. E.
Brazza, P.
Burckhardt, J. L.
Burton, R. F.
Chancellor, R.
Flinders, M.
Gray, R.
Hakluyt, R.
Hedin, Sven
Johnston, H. H.
Kane, E. K.
Kiepert, H.
Kingsley, M. H.
Kohl, J. G.
La Hontan, A. L.
Lander, R. L.
Lapérouse, J. F.
Lockwood, J. B.
Major, R. H.
Malte-Brun, K.
Markham, C. R.
Przhevalski, N. M.
Ratzel, F.
Ravenstein, E. G.

Reclus, E.
Rennel, J.
Ritter, K.
Speke, J. H.
Sturt, C.

Still an other method of carrying on the study of geography would be to study the maps, and, wherever a particular region found there excites the reader's curiosity, turn to the appropriate article. Many other ways will suggest themselves, according to the individual's tastes, inclination, or requirements, and it will be found that an encyclopædia is the best means of gaining, not only a minute knowledge of any particular locality on the earth's surface, but also a broad perspective view of the whole field of human activity. For the gazetteer articles are not to be regarded merely as dealing with topics in geography. Taking any of the articles on the various countries of the globe, as the UNITED STATES, or JAPAN, such article may be made to supply detailed information on whatever topic may be the subject of study or reading: Zoölogy, Geology, Statistics, Finance, Education, Industry, or Transportation. To quote these articles and the accompanying maps would be to encumber the book with enormous lists of names, which the reader may be trusted readily to select for himself.

Chapter 25. Botany

BOTANY is the science that deals with plants in all their aspects.—their origin and development, nature, structure, life processes, classification, and distribution. The nature and origin of plants will be discussed in the general articles given below. All considerations of the form and structure of individual plants may be broadly classed under the general term Structural Botany, or Plant Anatomy. The study of the processes which constitute the life of a plant and the conditions which affect those processes is called Physiology. These two branches of the science are sometimes united under the term General Botany, as distinct from Specific or Systematic Botany, also called Taxonomy, which deals with the classification and description of the various kinds of plants. A somewhat recently established branch of the science is that of Ecology, which deals with the distribution of plants in general. Another branch represents the practical aspects of botany by a particular investigation of the plants which can be made to enter into human economy. This is Economic Botany, the science which has the closest bearing on the arts of agriculture and horticulture. For a general discussion of botanical science, see:

Botany
Biology
Evolution
Heredity

For General Methods of Botanical Investigation, see:

Botanical Laboratories (under Laboratory)
Botanic Garden
Herbarium
Index Kewensis

A. Structural Botany

This subject deals with the form and structure of individual plants, of the plant body as a whole, of its separate limbs and organs, of the various tissues of which these are composed, and of the minute structures of the cells which compose the tissues. The study of the individual cell has recently received so much attention that it has been elevated from a branch of Histology, which deals with the microscopic nature of tissues, to the separate science of Cytology. The study of the varying types of organs has been called Morphology, and this branch may be divided into the morphology of the sterile or vegetative organs and the morphology of the reproductive organs.

For General Articles on Structural Botany, see:

Vegetable Tissue
Anatomy of Plants
Growth (in Plants)
Morphology

I. Cytology. A description of the general structure and contents of the cell is given in the articles:

Cytology

Cell (in Plants)
Intercellular System
Protoplasm
Nucleus
Osmosis
Plasmolysis
Movement
Rotation

For the composition of the cell wall, see:

Cellulose
Lignin
Lignification
Micellar Theory

For the structure of the nucleus, see:

Nucleolus
Linin
Chromatin
Chromosome
Centrosome

For the cytoplasm, see:

Microsome
Plastids

The protoplasmic contents include a considerable variety of coloring matter. See:

Color in Plants
Chromoplast
Chromatophore
Endochrome
Chloroplast
Anthocyan
Chlorophyll
Leucoplasts
Elaioplasts
Erythrophyll
Etiolin
Etiolation
Carotin
Cyanophyll
Phycoerythrin
Phycophaein
Pyrenoid

Besides the protoplasm the cell often contains crystals and other bodies. See:

Raphides
Aleurone
Inulin
Starch

Finally the various constituents of the sap, digestive ferments, and secretions:

Sap
Sugar
Glucose
Enzyme
Diastase
Cytase
Lipase
Invertase
Oxidase
Pectase
Zymase
Latex

The mechanics of cell division are described under:

Mechanics of Development
Fission
Mitosis
Karyokinesis
Blepharoplast

II. HISTOLOGY. A general discussion of plant tissues is given in the article HISTOLOGY, section on *Histology of Plants.*

Tissues are variously classified. According to their general nature, the two most important kinds are described under:

Parenchyma
Collenchyma

In higher plants, the tissues are gen-

erally differentiated into three main systems. See:

Pith
Wood
Cortex

The general articles on woody tissue are:

Alburnum
Duramen
Vascular Tissue
Conducting Tissue
Mechanical Tissue
Mestome
Plerome

For the special structure of wood, see:

Fibrovascular Bundle
Fibre
Phloem
Bast
Hadrome
Leptome
Tylosis
Tracheæ (under Anatomy of Plants)
Tracheid
Sieve Vessels
Cambium
Pericycle
Medullary Ray

The various tissues found in the cortex are described in the articles:

Meristem
Epidermis
Cuticle
Endodermis
Hypodermis
Periblem
Dermatogen
Bark
Cork
Phelloderm
Phellogen

Other special forms of tissue are:

Aërenchyma
Palisade Cells
Mesophyll

III. Morphology of the Vegetative Organs.

For the general forms of plant bodies, see:

Thallus
Herb
Shrubs
Tree
Juvenile Forms

Some of the special forms or organs of fungi are described under:

Hypha
Mycelium
Plasmodium
Pileus

Higher plants are generally differentiated into stem, root, and leaves, all of which may carry minor organs or appendages. See:

Stem
Root
Leaf

For special forms of stems, see:

Tuber
Corm
Internode
Fasciation
Phylloclad

For their mode of branching:

Branching
Monopodial Branching
Dichotomy

For the forms and appearance of leaves, see:

Frond
Pinnule
Phyllodes

Petiole
Venation
Variegation
Anisophylly
Heterophylly

For their arrangement in the bud, see:

Leaf-Buds (under Bud)

The forms and appendages of the roots are described in the articles:

Root
Rhizoids
Root Tubercles

For the organs of respiration and exudation, see:

The Aërating System (under Anatomy of Plants)
Stomata
Lenticels
Hydathode

For the organs of support and similar use, see:

Tendril
Haustoria

Other appendages of plants are described under:

Trichome
Gland
Cilia of Plants
Bloom

IV. Morphology of the Reproductive Organs.

The vast majority of plants produce at certain periods of their life-history two sets of reproductive organs, the sexual and the asexual; and, in all plants above the algæ and fungi, these follow each other regularly in alternate generations. (See the general articles on sexual processes referred to under Physiology.) In this section, only those articles will be given which describe the sexual and asexual reproductive organs. These organs are present in some form throughout large classes of plants. Special morphology will be discussed under the appropriate heads in Systematic Botany.

Asexual reproduction is effected by spores and by vegetative off-shoots. For the latter, see:

Bud
Gemmæ
Bulb

For the organs of spore-reproduction, see:

Spore
Intine
Homospory
Heterospory
Microspore
Megaspore
Sporangium
Microsporangium
Megasporangium
Sporophyll
Microsporophyll
Megasporophyll

The organs of sexual reproduction are:

Gamete
Generative Cell
Oösphere
Sperm
Antheridium
Archegonium
Oögonium
Paraphyses
Oöspore

In the higher plants (Spermatophytes), the two sets of reproductive organs, sexual and asexual, are enclosed together in the flower. See:

Flower
Seed
Fruit

For the various modes in which flowers are arranged on the plant, see:

Inflorescence
Panicle
Cyme
Corymb
Ament
Disk

The parts of a flower are described in the articles:

Involucre
Calyx
Pappus
Corolla
Petal
Ligule
Nectary
Pistil
Ovary
Carpel
Ovule
Placenta
Stamen
Anther
Pollen
Epigyny
Hypogyny
Perigyny

The articles on the seed are:

Seed
Endosperm
Perisperm
Ovule
Nucellus
Embryo
Suspensor
Cotyledon
Hypocotyl

For the various kinds of fruits, see:

Achene
Berry
Capsule
Caryopsis
Drupe
Drupelet
Follicle
Glume
Legume
Nut
Pome

B. Physiology

Physiology is the science which deals with all the processes that constitute the life of an individual plant, the conditions, both internal and external, which affect plant life, and all the phenomena attending such processes and conditions. Just as we distinguish between vegetative and reproductive organs of a plant, so we may also distinguish between vegetative and reproductive life processes; and the former may be divided into the regular and constant processes, which maintain the life of a plant, and the more occasional responses to stimuli. Abnormal and pathological conditions also come within the scope of physiology. See Physiology of Plants.

I. In all perfect plants, there is a series of regular mechanical processes by which raw food material is brought to the digestive organs in the form of gases from the atmosphere, or of minerals dissolved in water from the soil; by other processes the digested food is carried to places of storage or growing

points, and the waste products are expelled from the system. See:

Respiration (in plants)
Aëration
Absorption (in plants)
Transpiration
Potometer
Imbibition
Osmosis
Turgor
Root Pressure
Conduction
Storage
Excretion
Secretion (vegetable)

II. The phenomena of digestion and growth are described in the articles:

Digestion in Plants
Food of Plants
Nutrition (in plants)
Mycorrhiza
Photosynthesis
Etiolation
Metabolism
Katabolism
Anabolism
Fermentation
Assimilation
Regeneration
Parasite, Plant
Saprophyte
Carnivorous Plants
Insectivorous Plants
Energy of Plants
Growth (in plants)
Auxanometer
Enzymes
Chloroplasts
Carotin
Etiolin

The various movements which plants are capable of are described under:

Movement
Moving Plant
Motor Organ
Locomotion
Nutation (in plants)

Plants are also capable of reacting to a great variety of stimuli. See:

Irritability
Stimulus
Tropism
Phototaxis
Heliotropism
Photoepinasty
Apheliotropism
Paraheliotropism
Nyctotropic
Sleep of Plants
Geotropism in Plants
Apogeotropism
Diageotropism
Hydrotropism
Aphydrotropism
Aërotropism
Rheotropism
Thermotropism
Chemotaxis
Chemotropism
Electrotaxis
Electrotropism
Traumatropism
Sensitive Plant
Hyponasty
Epinasty
Clinostat
Tendril
Lianas

Reproductive processes may be divided into those which take place within the individual plant, and those which are affected by the relation of the individual plant to its environment. The latter are referred to under Ecology (see C below), while only the former are described in the following articles:

Reproduction (in plants)
Vegetative Propagation

Sex in Plants (under Sex)
Conjugation
Rejuvenescence
Isogamy
Apogamy
Parthenogenesis
Vivipary
Fertilization
Germination
Alternation of Generations
Gametophyte
Sporophyte

A discussion of the abnormal and pathological in plant life is given in the articles:

Teratology
Monstrosity
Malformation
Abortion in Plants (under Abortion)
Vestigial Structures
Concrescence
Galls

C. Ecology

Ecology is the science that deals with the relation of a plant to its environment. This relation may be that of sexual intercourse, relation to the soil, situation, climate, moisture conditions, relation to other plants and to animals, and any other external conditions that affect the situation of a plant, its growth, or the length of its life, either in the individual or in the species or race. Ecology is thus the study of the distribution of plants in the broadest sense. See:

Ecology
Distribution of Plants
Bionomics
Floristics
Dysteleology
Adaptation
Epharmony

1. The relations of the reproductive functions of a plant to the environment are discussed in the articles:

Pollination
Pollen
Hybrid
Dispersal

The special arrangements which affect cross-pollination are described under:

Cleistogamy
Allogamy
Geitonogamy
Monœcism
Diœcism
Dichogamy
Entomophilous Plant
Anemophilous Plants
Hydrophilous

For the relation of plants to the soil, see:

Humus Plants
Lime Plants
Clay-Plants
Nitrophilous Plants
Halophyte
Dune Vegetation
Rock Plants
Epiphyte

For the relation of plants to genera localities, see:

Autochthonous
Endemism
Naturalization
Migration of Plants

and, to specific situations:

Mountain Plants
Alpine Plant
Cliff-Plants
Beach Plants
Ruderal Plants
Hylophytes
Benthos
Enalids
Plankton

For the relation of a plant to moisture and climate, see:

Hydrophytes
Hygrophytes
Mesophyte
Amphibious Plants
Xerophytes
Desert Vegetation
Arctic Plants (under Arctic Region)
Acclimatization
Phenology

The relation of a plant to other plants, and to animals, may be considered under two aspects:

(*a*) There is often a close sympathetic relation between individual plants, and between an individual plant and animals. See:

Symbiosis
Endophyte
Epiphyte
Parasite, Plant
Obligate Plants
Faculative Plant
Entomophilous Plant
Myrmecophytes
Phycomycetes

(*b*) There is also a general relation due to soil, climate, struggle for existence, etc., between large numbers of individuals growing together and constituting what are known as plant societies. See:

Distribution of Plants
Form
Formation
Forest
Jungle
Thicket
Grasslands
Savannas
Steppe
Prairie
Llanos
Pampas
Meadow
Tundra
Swamp
Mangrove Swamp
Cypress Swamps

The nature of plant societies is also largely affected by the vegetative duration of its members. See:

Duration
Annuals
Biennials
Perennials
Æstival
Vernal Grass
Deciduous Plants
Evergreen
Geophyte

D. Systematic Botany

This branch of the science of Botany comprises the classification of plants, the description of every known species and of the larger divisions—genera, families, orders, classes, etc.—into which all species are grouped. Sys-

tematic Botany also includes the study of the relationships between the various groups and species of plants, and of their geographical distribution. It is obviously impossible here to refer to all the articles on even the more important genera; but, as the representative genera of each order are referred to in the article on the order, it is sufficient to give only the latter and the higher groups. For a general article on systematic botany, see TAXONOMY.

The whole vegetable kingdom is generally divided into four sub-kingdoms. See:

Thallophytes
Bryophytes
Pteridophytes
Spermatophytes

I. The Thallophytes are divided into two parallel series. See:

Algæ
Fungi

1. The Algæ are generally grouped into four classes. See:

Cyanophyceæ
Chlorophyceæ
Phæophyceæ
Rhodophyceæ

2. For the main divisions of the Fungi, see:

Myxomycetes
Schizomycetes
Ustilaginales
Phycomycetes
Ascomycetes
Uredinales
Basidiomycetes
Lichens

II. The Bryophytes are grouped in two main divisions. See:

Hepaticæ
Musci

III. The living Pteridophytes fall into three main groups, the last two of which are generally called "the higher fern." See:

Fern
Equisetum
Lycopodiales

IV. The Spermatophytes, or seed-plants, form the bulk of the vegetation which covers the earth. They are divided into two classes. See:

Gymnosperms
Angiosperms

1. The living Gymnosperms are grouped into four orders. See:

Coniferæ
Cycadaceæ
Gnetaceæ
Ginkgo

2. The Angiosperms consist of numerous orders, which fall into two natural sub-classes. See:

Monocotyledons
Dicotyledons

(*a*) The principal orders of Monocotyledons are described under:

Pandanaceæ
Typha
Gramineæ
Cyperaceæ
Palm
Arum
Bromeliaceæ
Liliaceæ
Smilaceæ
Amaryllidaceæ
Dioscoreaceæ
Iridaceæ
Musaceæ
Zingiberaceæ
Orchid

(*b*) The following are the most important orders of Dicotyledons, arranged in their order of relationship. Important genera of orders not separately described are inserted in their proper places.

Archichlamydeæ:

Mainly Apetalous. Chiefly Trees:
- Piperaceæ
- Juglandaceæ
- Willow
- Poplar
- Birch
- Alder
- Cupuliferæ
- Moraceæ
- Urticaceæ
- Elm

Chiefly Weeds:
- Polygonaceæ
- Chenopodiaceæ
- Amarantaceæ
- Mesembryaceæ
- Caryophyllaceæ

Mainly Polypetalous. Buttercup Types:
- Nymphæaceæ
- Magnolia
- Ranunculaceæ
- Berberidaceæ
- Lauraceæ

Poppy Types:
- Papaveraceæ
- Fumariaceæ
- Cruciferæ

Insectivorous Plants:
- Sarracenia
- Sundew

Rose Types:
- Saxifrage
- Plane
- Rosaceæ
- Leguminosæ

Geranium Types:
- Geranium
- Zygophyllaceæ
- Polygala
- Euphorbiaceæ

Maple Types:
- Burseraceæ
- Anacardiaceæ
- Holly
- Maple
- Sapindaceæ
- Horse-Chestnut

Buckthorn Types:
- Rhamnaceæ
- Vitaceæ

Mallow Types:
- Tiliaceæ
- Malvaceæ

Violet Types:
- Ternstrœmiaceæ
- Violaceæ

Cactus Type:
- Cactus

Myrtle Types:
- Lythraceæ
- Myrtaceæ

Carrot Types:
- Umbelliferæ
- Dogwood

Sympetalæ:

Heath Types:
- Ericaceæ
- Huckleberry

Primrose Type:
- Primulaceæ

Ebony Types:
- Sapotaceæ
- Ebony

Gentian Types:
- Loganiaceæ
- Gentianaceæ
- Apocynaceæ
- Asclepiadaceæ

Phlox Types:
- Convolvulaceæ
- Polemoniaceæ
- Boraginaceæ
- Labiatæ
- Solanaceæ
- Scrophulariaceæ
- Bignonia

Madder Types:
- Rubiaceæ
- Caprifoliaceæ

Bell-Flower Types:
- Cucurbitaceæ
- Campanulaceæ
- Compositæ

E. Economic Botany

In its narrow sense, viewed as a strictly botanical science, economic botany is the study of those plants which are, or can be, used for some purpose in human economy. If we inquire further into the methods by which these plants are made available, we enter upon the fields of agriculture, pharmacy, mechanical arts, etc. By the above definition, economic botany includes a study of the common cultivated plants, such as the cereals, but, to avoid repetition, the cultivated plants are referred to only in the chapter on Agriculture, Horticulture, and Forestry. We shall therefore confine ourselves here to the articles describing the important wild, or not commonly cultivated, economic plants, classified according to their uses.

I. Plants Used for Food:
- Adansonia
- Areca
- Banana
- Brazilnuts
- Breadfruit Tree
- Butter-Tree
- Caryocar
- Caryota
- Cashew Nut
- Cherimoyer
- Cocco
- Cocoanut
- Euryale
- Fungi, Edible
- Granadilla
- Grass-Tree
- Hog-Plum
- Iceland Moss
- Jubæa
- Mammee Apple
- Maple
- Mushroom
- Nelumbo
- Palmyra Palm
- Papaw
- Prickly Pear
- Reindeer Moss
- Sago
- Tamarind
- Ti
- Walnut
- Water-Chestnut

II. Plants Used in Preparing Beverages:
- Beverage Plants
- Agave
- Assai

Ava
Buriti Palm
Carrageen
Elder
Maté
Palmyra Palm
Sloe
Woodruff

III. Plants Used as Condiment or in Confectionery:

Flavoring Plants
Anise
Caper
Cardamom
Cinnamon
Coriander
Ginger
Jujube
Juniper
Laurel
Licorice
Marjoram
Marsh-Mallow
Mint
Pepper
Tonka Bean
Vanilla

IV. Plants Used in Perfumery:

Boswellia
Lemon-Grass
Lignum Rhodium
Lily of the Valley
Musk Plant
Myrrh
Patchouli
Ylang Ylang

V. Plants Yielding Pigments:

Alkanet
Aloe
Brazil Wood
Buckthorn
Butea
Camwood
Chay Root
Fustic
Henna
Indigo
Logwood
Marking-Nut
Walnut
Weld
Yam
Zamia

VI. Plants Yielding Gums, Wax, Oils, etc.:

Butter Tree
Calophyllum
Canarium
Candleberry
Candle-Nut
Carnauba Palm
Cashew Nut
Dammar
Elæococca
Fir
Grass-Tree
Mastic
Mesquite Tree
Oil Palm
Pine
Tallow Tree

VII. Plants Yielding Fibre:

Agave
Aloe
Astrocaryum
Attalea
Bromelia
Broom
Butea
Carnauba Palm
Caryota
Chamærops
Corchorus
Crotalaria

Eriodendron
Giant Lily
Gomuti
Jute
Kapok
Ootrum
Piassaba
Yucca

VIII. Plants Used for Timber and Cabinet Wood:

Ash
Boxwood
Butternut
Calophyllum
Cedar
Cypress
Dacrydium
Dalbergia
Elm
Eucalyptus
Fir
Gmelina
Greenheart
Guaiacum
Hemlock Tree
Hornbeam
Ilex
Kauri Pine
Lignum Vitæ
Lime Tree
Mammee Apple
Maple
Oak
Palmetto
Palmyra Palm
Pine
Plane
Podocarpus
Spruce
Tamarind
Teak
Tulip Tree
Walnut

IX. Plants Used for Ornamental Cabinet Woods:

Aloes Wood
Ebony
Holly
Letterwood
Mahogany
Palmyra Wood
Rosewood
Sandalwood
Satinwood

X. Plants Supplying Various Primitive Needs:

Bottle Gourd
Bussu Palm
Calabash Tree
Daphne
Nipa
Palmyra Palm
Papyrus
Rattan

XI. Plants Used Directly in Industrial Arts:

Carludovica Palmata
Ice Plant
Ivory, Vegetable
Myrobalan
Oak
Quebracho
Rattan

XII. Medicinal Plants:

Aconite
Acorns
Adansonia
Agrimony
Akee
Allamanda
Aloe
Alum Root
Angelica
Angostura Bark
Aristolochia
Arnica

Asarabacca
Belladonna
Bittersweet
Broom
Butterfly-Weed
Cajeput
Calabar Bean
Carrageen
Cascarilla
Cassia
Centaury
Choke-Cherry
Cinchona
Cissampelos
Coca
Croton
Cubebs
Dill
Dock
Dogbane
Elder
Erigeron
Ergot
Eucalyptus
Feverwort
Gentian
Geum
Guaiacum
Horehound
Houseleek
Ipecacuanha
Jalap
Licorice
Mint
Myrrh
Poppy
Strychnos
Witch-Hazel
Zanthoxylum

XIII. Poisonous Plants

Poisonous Plants
Abrus
Amanita
Andromeda
Belladonna
Bittersweet
Bitterwood
Calabar Bean
Cherry-Laurel
Cocculus Indicus
Colchicum
Fungi, Edible and Poisonous
Hemlock
Henbane
Kalmia
Laburnum
Manchineel
Nightshade
Poison Oak
Stramonium
Sumach
Tanghin
Upas

XIV. Biographies of Eminent Botanists:

Adanson, M.
Barton, W. P. C.
Bauhin, J.
Bentham, G.
Bigelow, J.
Bonnier, G.
Boussingault, J. B. J. D.
Braun, A.
Brongniart, A. T.
Brown, R.
Brunfels, O.
Chapman, A. W.
Cohn, F. J.
Darlington, W.
De Candolle, A. L. P. P.
Desfontaines, R. L.
Eichler, A. W.
Engler, H. G. A.
Endlicher, S. L.
Gray, Asa
Grew, N.

Hellriegel, H.
Hooker, Sir J. D.
Hooker, Sir W. J.
Jackson, B. D.
Jussieu
Ledebour, K. F. de
Lenné, P. J.
Lindley, J.
Link, H. F.
Linnæus, Carolus
Michaux, A.
Mohl, H. von
Morong, Thomas
Muhlenberg, G. H. E.
Nees von Esenbeck, C. G.
Nuttall, T.
Persoon, C. H.
Pfeffer, W.
Plumier, Charles
Rafinesque, C. S.
Sachs, J. von
Saussure, N. T. de
Schleiden, M. J.
Schultze, M. S.
Schweinitz, L. D. von
Sullivant, W. S.
Thunberg, K. P.
Thurber, George
Torrey, J.
Tournefort, J. P. de
Unger, F.
Watson, S.

Chapter 26. Agriculture, etc.

THE systematic and artificial cultivation of plants for the purpose of supplying human necessities or luxuries constitutes the arts of Agriculture, Horticulture, and Forestry, or the cultivation of the field, the garden, and the forest. The distinctions between these three arts, however, are not so definite as one might suppose, and the apportionment among them of the articles dealing with plant culture will be more or less arbitrary. Thus Forestry and Horticulture meet in the arts of Arboriculture and Landscape Gardening. The products of Horticulture are, as a rule, luxuries rather than necessities; but the raising of vegetables for the table, although they are almost necessary articles of food, is generally treated under Horticulture rather than under Agriculture. The latter term is best confined to the cultivation on a large scale of products used extensively in human economy, and this distinction will be the basis for the following divisions of the whole subject.

A. Agriculture

Agriculture, as its name implies, is the cultivation of the field, mainly for the purpose of providing a regular supply of organic food, both plant and animal. This indicates the two main divisions of farming, namely, the raising of food plants and the raising of animals. The former is, perhaps, the more complex process, requiring a more elaborate equipment of tools and machinery. It involves the selection and preparation of the soil, the sowing of the seed, the care of the growing crop, the prevention and cure of crop diseases, and the harvesting, manipulation, and disposition of the crop when ripe. The raising of animals involves their selection and breeding, the feeding and care of the animals, attention to the numerous diseases to which they are subject, and the manipulation and disposition of animal products, including the art of dairying. In connection with both branches of agriculture, there is the general management of the farm and its equipment. For a history of the development of agriculture in the various countries, see the article, AGRICULTURE.

I. For the general articles on the farm and its equipment, see:

Farm Buildings
Implements, Agricultural
Farm Management
Dry Farming

II. The preparation of the soil requires, first, the selection of a soil suited for the crop, and often its artificial fertilization; and, second, its tillage and irrigation.

For the selection of soil, see:

Soil
Humus
Alkali Soils
Chernozem
Gumbo Soil
Fallow
Waste Lands
Rotation of Crops

For fertilization and fertilizers, see:

Chemistry, Agricultural

Fertilizers
Manures and Manuring
Green Manuring
Nitrification
Sewage Farming
Soil Amendments
Fish Manures
Bone Fertilizers
Guano
Marl
Compost
Gypsum
Poudrette
Lupine
Superphosphate
Thomas Slag

The processes of tillage are described under:

Tillage
Cultivator
Plow, Plowing

For the irrigation and drainage of the soil, see:

Irrigation
Drainage
Ditch
Mulch
Warping
Lysimeter

When the soil has been prepared and tilled, the seed is sown. See:

Seed Testing
Broadcasting
Drill
Harrow

When the crop is ripe, it is harvested and prepared for the market. See:

Harvest and Harvesting
Reapers, Reaping
Threshing
Hummeler
Fan, or Fanner

III. The principal crops which are the subjects of agriculture are, of course, the food plants, and of these the most important are the cereals. Other plants, however, aside from those which are the subjects of horticulture, are also regularly cultivated, such as forage plants (see under Stock-Raising below), and plants used for fibre and various other purposes.

For the principal cereals, see:

Cereals
Barley
Buckwheat
Maize
Millet
Oat
Rice
Rye
Wheat

Other food crops are:

Artichoke
Artichoke, Jerusalem
Bean
Beet
Cassava
Cowpea
Dolichos
Lentil
Pea
Potato
Pumpkin
Sago
Sorghum
Soy Bean
Sugar Beet
Sugar-Cane
Sweet Potato

(For vegetables and fruits, see under section on Horticulture.)

Plants cultivated for fibre are:

Bœhmeria
Cotton

Flax
Hemp
Hemp, Bowstring
Hemp, Manila
Hemp, Sisal
Hemp, Sunn
Henequen
Ramie

Tobacco is also an important agricultural crop. See article TOBACCO.

IV. The care of the growing crop is of sufficient importance to have separate treatment, and the study and treatment of plant diseases is a science by itself. The principal cause of plant diseases are bacteria and fungi, and almost every kind of crop has its specific insect pests. These are all described in separate articles following the articles on the crops, under such titles as COTTON INSECTS, RICE INSECTS, etc., and, therefore, need not be enumerated here. The general articles on plant diseases and their treatment, and on diseases common to several crops are:

Diseases of Plants
Fungicides
Insecticides
Insect Powder
Mildew
Blight
Botrytis
Canker
Chlorosis
Damping Off
Dry Rot
Ergot
Gummosis
Rust
Smuts

The special diseases which affect particular crops are treated in the articles on the separate crops, but a few are described in separate articles. See:

Bunt
Cornstalk Disease
Crown-Gall
Ear Cockles
Clubroot
Oidium

Some of the common weeds with which the farmer and gardener have to contend are described in the articles:

Weed
Burdock
Chickweed
Chufa
Cockle
Chenopodium
Dodder
Orache
Pigweed
Tare

V. The raising of live-stock is the second great department of agriculture, and involves the selection of the animals, their breeding and general care, a supply of the proper feed stuffs; attention to diseases, which constitutes the practice of veterinary medicine; and the preparation of the animal products for the market.

The most important animals raised as live-stock are described in the articles:

Horse
Cattle
Mule
Sheep
Goat
Hog
Poultry
Fowl
Duck
Goose

Turkey
Pigeon
Bee

For the breeding and general care of the animals, see:

Breeds and Breeding
Incubator
Horseshoeing
Hoof
Dehorning
Feeding Farm Animals
Soiling, Soiling Crops
Bee-Keeping

Feeding stuffs may be divided into two general classes, natural or growing forage plants and the more or less artificially prepared feeds. The forage plants may again be divided into grasses and those that are not grasses, the latter being largely leguminous plants. See:

Feeding Stuffs
Pasture
Meadow

For forage grasses, see:

Grasses
Agropyron
Andropogon
Bermuda Grass
Blue Grass
Brome Grass
Buffalo-Grass
Canary-Grass
Crab-Grass
Gama Grass
Manna-Grass
Meadow Grass
Millet
Oat Grass
Orchard Grass
Redtop Grass
Rye-Grass
Sorghum
Teosinte
Timothy Grass

The principal forage plants other than grasses are:

Alfalfa
Burnet
Chufa
Clover
Cowpea
Fescue
Lupine
Mangel-Wurzel
Medicago
Medick
Melilot
Rape
Sainfoin
Serradella
Soy Bean
Sulla
Trefoil
Vetch

For the most important prepared feeds, see:

Brewers' Grains
Gluten Meal
Cottonseed Meal
Hay
Linseed Meal
Malt Sprouts
Silage

Farm animals are subject to numerous serious diseases, and the investigation and treatment of these constitute the profession of veterinary medicine. A convenient subdivision of animal diseases is according to the kinds of animals which they affect, since, with a few exceptions, each disease is either peculiar to, or chiefly prevalent in, a particular species. Several of these given under cattle diseases, however,

may also affect horses or sheep, and vice versa.

(*a*) The general articles on the subject and those dealing with diseases common to several kinds of live-stock are:

Veterinary Medicine
Diseases of Animals
Abortion
Anthrax
Colic in Animals
Ring Worm
Mange
Tuberculosis (in animals)

(*b*) For diseases primarily affecting the horse, see:

Azoturia
Bighead
Canker
Curb
Fistula
Founder
Glanders
Heaves
Hoof
Influenza in Animals
Meningitis
Navicular Disease
Roaring
Strangles
Stringhalt
Spavin
Thrush

(*c*) For diseases of cattle, see:

Actinomycosis
Blackleg
Cattle Plague
Fardel-bound
Foot-and-Mouth Disease
Joint-Ill
Malignant Catarrh
Mammitis
Milk Fever
Red Water
Texas Fever

(*d*) For diseases of sheep, see:

Agalactia
Bloat
Braxy
Fardel-bound
Gid
Icterohæmaturia
Liver-Rot
Lung-Worms
Nodular Disease

(*e*) For a disease of hogs, see:

Hog Cholera

(*f*) For diseases of poultry and bees, see:

Blackhead
Gapes
Roup
Diarrhœa, White, of Chickens
Foul Brood

VI. In the preparation of animal products for the market, one of the most elaborate, as well as important, departments is that of Dairying. This industry involves the supply of milk and cream, and the manufacture of butter and cheese. For a general article on the subject and articles on the processes of manufacture, and the machinery and equipment of the dairy, see:

Dairying
Milking Machine
Aërator
Creamery
Separator
Butter-Making
Churn
Butter-Worker
Butter-Color
Cheese-Making

Cheese Factory
Rennet

For the principal dairy products, see:

Milk
Skim Milk
Casein
Cream
Butter
Cheese
Buttermilk
Milk Sugar (under Sugars)
Ghee
Kephir
Koumiss
Whey

VII. Other more or less direct products of agriculture and stock raising, and the methods of their disposal, are described under:

Market and Marketing
Flour
Farina
Semolina
Food
Bread
Sugar
Honey
Glucose
Meat
Pork
Leather
Wool

See also POULTRY and EGG and the articles there referred to.

VIII. Since the patriarchal stage, Agriculture has been regarded as the most important of human industries, and is the one which has especially received direct and official attention from the governments of civilized nations. There are also at present numerous educational institutions, and private or semi-public associations for the advancement of the industry. See:

Agriculture, U. S. Department of
Agricultural Experiment Station
Agricultural Education
Farmers' Institute
Agricultural Association
Grange

IX. For biographies of eminent agriculturists, see:

Atwater, W. O.
Brewer, W. H.
Goodell, H. H.
Harris, J.
Hellriegel, H.
Hilgard, E. W.
Holdefleiss, F. W.
Johnson, S. W.
Judd, O.
Lawes, J. B.
Maercker, M.
Morris, Daniel
Ruffin, E.
Thaer, A. D.
True, A. C.
Wallace, R.
Young, A.

B. Horticulture and Forestry

Horticulture is the art of producing plants which are valued for their agreeable properties rather than as necessities for human comfort. The horticultural methods of breeding, propagating, and cultivating plants differ essentially from the agricultural method in that great attention is paid to the individual plant, while in agriculture attention is given to the crop

as a whole, in which the individual is lost. The subjects and products of horticulture are flowers, ornamental shrubs and trees, fruit trees, plants used as condiments, vegetables for the table, when considered merely as accessories to the more substantial articles of food, and all other plants treated by horticultural methods.

Horticulture also concerns itself with the laying out of gardens, and in this field of its activity it merges into landscape gardening and forestry. The latter, however, is a purely economic art and is not a branch of horticulture. It is included in this section because it is not yet a highly complex art and is, therefore, treated in a few general articles. For the general articles on Horticulture and Forestry, see:

Horticulture
Floriculture
Landscape Gardening
Arboriculture
Forestry
Afforestation

I. The buildings and equipments used by the horticulturist are described in the articles:

Greenhouse
Hothouse
Conservatory
Frame
Espalier
Hoe

One of the principal aims of horticulture is to develop particularly desirable varieties of plants and to maintain them true to the stock. For this purpose, special methods of breeding and propagation are necessary. See:

Plant-Breeding
Nursery
Budding
Cutting
Grafting
Layering
Caprification

Special methods are also necessary in raising the young plants to maturity and securing the desired qualities in the matured product. See:

Forcing
Bottom Heat
Electro-culture of Plants
Pruning
Cordon
Blanching

For the most important plants cultivated in greenhouses, see:

Greenhouse Plants
Achimenes
Azalea
Banksia
Carnation
Chrysanthemum
Fuchsia
Gardenia
Gladiolus
Hyacinth
Lily, Lily of the Valley
Mignonette
Oleander
Passion-Flower
Pelargonium

II. The principal articles on gardens, ornamental shrubs, and garden plants are:

Lawn
Hedge
Ampelopsis
Azalea
Canna
Centaurea
Chrysanthemum

Convolvulus
Cosmos
Cotoneaster
Cowslip
Dahlia
Eschscholtzia
Heliotrope
Hibiscus
Hollyhock
Hyacinth
Hydrangea
Ivy
Jasmine
Jonquil
Laburnum
Larkspur
Laurustinus
Lavender
Libocedrus
Lilac
Lily
Lily of the Valley
Mignonette
Narcissus
Peony
Petunia
Phlox
Pink
Polyanthus
Poppy
Rose
Star of Bethlehem
Sunflower
Sweet Pea
Thrift
Tropæolum
Trumpet Flower
Tuberose
Tulip
Wallflower
Wistaria

III. For the principal articles on fruit trees and fruit culture, see:

Fruit, Cultivated
Orchard
Apple
Apricot
Banana
Blackberry
Butternut
Calville
Cherimoyer
Chestnut
Cranberry
Currant
Custard-Apple
Date
Dewberry
Earthnut
Fig
Gooseberry
Grape
Hazelnut
Huckleberry
Kumquat
Lemon
Lime
Litchi
Loquat
Mango
Melon
Mulberry
Muskmelon
Olive
Orange
Peach
Peanut
Pear
Persimmon
Pineapple
Plum
Pomegranate
Quince
Raspberry
Strawberry
Walnut
Watermelon

For table vegetables, see:

Vegetables
Herbs, Culinary
Salad Plants
Asparagus
Brussels Sprouts
Cabbage
Carrot
Cauliflower
Celery
Corn-Salad
Cress
Cucumber
Egg Plant
Endive
Garlic
Kale
Kohl-rabi
Leek
Lettuce
Mushroom
Onion
Parsley
Parsnip
Radish
Rhubarb
Salsify
Spinach
Squash
Tomato
Truffle
Turnip

V. For the principal plants cultivated for their flavoring qualities, see:

Flavoring Plants
Allspice
Almond
Capsicum
Caraway
Chicory
Chive
Cinnamon
Citron
Cloves
Fennel
Hop
Horseradish
Mace
Mustard
Nutmeg
Pepper
Pistacia
Thyme
Vanilla

VI. The section on horticulture should also include reference to the articles on the well known beverage plants, and on some of the more direct products of horticulture. See:

Coffee
Tea
Cacao
Wine
Cider
Prune
Raisins

VII. For biographies of eminent horticulturists and foresters, see:

Bailey, L. H.
Burbank, L.
Downing, A. J.
Downing, C.
Duhamel du Monceau
Henderson, P.
Hess, R.
Heyer, G.
Heyer, K. J.
Hovey, C. M.
Kenrick, W.
Koristka, K. von
Landreth, D.
Lodeman, E.
Longworth, N.
Loudon, J. C.
Lyon, T. T.
Manning, R.

See also HORTICULTURAL SOCIETIES.

Chapter 27. Zoology

EVERY topic of importance in Natural History, especially as represented in America, is contained in the pages of the *New International Encyclopædia*, which thus may justly be called a complete text-book of zoölogy. The outline of our knowledge of animal life thus furnished is supplemented, in respect to each part of it, by references to special books, museum collections, and other sources of knowledge where the student may find the minute details and investigations interesting and necessary to the specialist, but superfluous to a general reader. The material contained in the Encyclopædia is thus equally useful to the deep and to the superficial inquirer; for the specialist in one department of science needs to have at hand general information, at least, as to other departments.

Zoölogy has two aspects: (a) that of its observed facts; and (b) that of the principles involved: phenomena and deductions; condition and theory. The foremost or basic part is a knowledge of the facts of the animal world, namely: Form and Structure; Reproduction, Embryology and Growth; Habit; Instinct; Distribution, past and present; Relationship, of animals to one another, and to their environment. From these have been deduced the facts of the Classification and Evolution of forms.

STRUCTURE.

The reader who seeks to take the topics dealing with Form and Structure in order may read the following articles:

Biology
Morphology
Animal
Protoplasm
Cell
Amœba
Embryology
Anatomy
Bone
Skeleton; and the more particular accounts of its component parts, as SKULL, HAND, SHOULDER-JOINT, etc.
Muscular System
Circulatory System
Alimentary System
Excretory System
Respiratory System
Nervous System and Brain
Cephalization
Metamerism
Integument
Horn
Hoof
Nail
Teeth
Hair
Feather
Pterylosis
Scales
Pigment
Metachrosis
Chromatophore
Melanism
Touch
Taste
Smell
Eye
Ear

The structure of various animals, as characteristic of groups, is given in such general articles as:

Amblypoda

Ammonites
Amphibia
Annulata
Arachnida
Archæopteryx
Bat
Beetle
Bird
Bovidæ
Butterflies and Moths
Brachiopoda
Camelidæ
Canidæ
Carnivora
Cephalopoda
Cestoda
Chordata
Cœlenterata
Coral
Crinoidea
Crustacea
Deer
Dinosauria
Dipnoi
Echinodermata
Elasmobranchii
Electric Fish
Felidæ
Fish
Fly
Fringillidæ
Frog
Ganoidei
Gastropoda
Holothurian
Horse, Evolution of the (under Horse, Fossil)
Hydrozoa
Hymenoptera
Infusoria
Insect
Mammalia
Marsupialia
Medusa
Mollusca
Ophiuroidea
Prototheria
Protozoa
Pterodactyl
Pteropoda
Reptile
Rodentia
Sirenia
Snake
Turtle
Ungulata
Vertebrata

For the most part, the articles referred to contain, incidentally or cited in the appended Bibliography, the names of investigators identified with these particular subjects. In the great majority of cases the biography of each of these men is to be found in its alphabetical position in the Encyclopædia; and an earnest reader will turn to it, and so acquaint himself with the man by whose learning he is profiting.

Reproduction and Growth.

Animals continue to exist by reproducing their kind after various methods, and each individual passes through a more or less complicated series of changes from its beginning to its maturity, collectively known as its life-history, or autogeny. An orderly study of this essential phase of animal life may be conducted by reading the articles mentioned below, with the lesser ones indicated by cross-references:

Reproduction
Spontaneous Generation
Egg
Spermatozoön
Gemmule
Sex
Embryology

Fœtus
Epigenesis
Mitosis
Parthenogenesis
Alternation of Generations
Biogenesis
Cross-fertilization
Metamorphosis
Larva
Pupa
Metabolism
Growth
Regeneration
Heredity
Pangenesis
Prepotency
Telegony
Mendel's Law
Breeds and Breeding
Hybridity
Nidification

HABITS.

The habits of animals constitute the principal feature of what may be called Descriptive Zoology—that is, accounts of a species or a group of species placed under the vernacular name. This policy has been adopted, rather than that of putting descriptions under technical names, for greater convenience of reference, as well as to avoid that attitude of pedantry which made the earlier encyclopædias often ridiculous. The majority of readers would turn more naturally to HORSE than to "Equidæ" or to BLACKSNAKE than to "Zamenis." The technical characteristics of many of the larger groups, lacking any English appellative, are given under their term in classification, as PROTOZOA, BOVIDÆ, and the like, or sometimes under the name of the special science dealing with them, as ICHTHYOLOGY, ORNITHOLOGY. Habits of animals, then, may be learned from the descriptive articles generally, the principal of which are given below:

Agate Shell
Agouti
Albatross
Alewife
Alligator
Anaconda
Ani
Ant
Antelope
Ant-lion
Aoudad
Apteryx
Armadillo
Ass
Auk
Aurochs
Axolotl
Aye-aye
Baboon
Badger
Bandicoot
Bank swallow
Barn-owl
Barn-swallow
Bass
Bat
Bear
Beaver
Bedbug
Bee
Bighorn
Bird of Paradise
Bison
Bittern
Blackbird
Blacksnake
Bluebird
Bluefish
Boa

Bobolink
Bollworm
Bookworm
Bot
Bower-bird
Brant
Buffalo-bird
Bug
Bulbul
Bumblebee
Bunting
Bushmaster
Bustard
Butterfish
Butterflies
Buzzard
Caddis-fly
Camel
Capercaillie
Capybara
Caribou
Carp
Carpenter Bee
Cat
Cattle
Cave Animals
Cavy
Chameleon
Chamois
Chinch-bug
Cicada
Civet
Clam
Clothes-moth
Cockatoo
Cockroach
Cod
Conch
Condor
Copperhead
Cowbird
Coyote
Crab
Cricket
Crocodile
Crow
Cuckoo
Curlew
Death Adder
Deathwatch
Deer
Devilfish
Dingo
Dodo
Dog
Dove
Dragon-fly
Duck
Duckbill
Dugong
Duiker
Eagle
Earthworm
Eel
Eider
Elephant
Electric Fish
Ermine
Falcon
Fer-de-lance
Firefly
Fish-hawk
Flamingo
Flea
Flesh-fly
Fly
Fly-catcher
Flying Squirrel
Fox
Frog
Gall-insects
Gannet
Garefowl
Gazelle
Gibbon
Gipsy Moth
Giraffe
Gnat

Goat
Goldfinch
Goose
Gopher
Gorilla
Goshawk
Grayling
Grebe
Grouse
Guanaco
Gull
Halibut
Hare
Hawk
Hedgehog
Hermit Crab
Heron
Herring
Hessian Fly
Hippopotamus
Hognose
Hook-worm
Hornbill
Horse
Hound
House-fly
Humming-bird
Hyena
Ibex
Ibis
Iguana
Jackal
Jackdaw
Jaguar
Jay
Jelly-fish
Jungle Fowl
Kangaroo
Katydid
King-bird
Kingfish
Kingfisher
Kraken
Lace-bug
Lamprey
Land Tortoise
Leech
Lemming
Lemur
Leopard
Lion
Lizard
Llama
Lobster
Lory
Louse
Lungfish
Mackerel
Mallard
Mammalia
Mammoth
Manatee
Man-eater Shark
Marsh Hawk
Marten
Maskinonge
Mastodon
Menhaden
Mole
Mollusk
Monkey
Moose
Mosquito
Moth
Mouse
Mule Deer
Mungoos
Musk Ox
Muskrat
Narwhal
Nest
Nightingale
Nightjar
Nurse-frog
Nutria
Opossum
Orang-utan
Oriole

Ostrich
Otter
Owl
Oyster
Palolo Worm
Parrakeet
Parrot
Partridge
Peacock
Pheasant
Pigeon
Pipa
Pipefish
Plant-bug
Plover
Polecat
Pompano
Porcupine
Porpoise
Potato Insects
Prairie Dog
Ptarmigan
Puma
Python
Quagga
Quail
Quinnat Salmon
Rabbit
Raccoon
Rail
Rat
Rattlesnake
Raven
Ray
Rhinoceros
Road-runner
Robin
Rocky Mountain White Goat
Roe Deer
Rook
Sable
Salamander
Salmon
Sandpiper
Sardine
Sawfish
Scale Insect
Scorpion
Sea-anemone
Sea-bass
Sea-horse
Seal
Sea-otter
Sea-urchin
Shark
Sheep
Sheepshead
Shore-birds
Shrew
Shrike
Shrimp
Silkworm
Skunk
Skylark
Sloth
Smelt
Snail
Snake
Snipe
Spaniel
Sparrow
Spider
Sponge
Sporozoa
Squid
Squirrel
Starfish
Stickleback
Stork
Sturgeon
Sunfish
Swallow
Swan
Swift
Swine
Tailor-bird
Tanager
Tapeworm

Tapir
Tarantula
Tautog
Termite
Terrapin
Terrier
Thread-worms
Thrush
Tick
Tiger
Tiger-hunting
Tilefish
Titmouse
Toad
Toucan
Tree-frog
Trogon
Trout
Tsetse-fly
Turbot
Turkey
Turtle
Umbrella-bird
Vampire
Veery
Viper
Vireo
Viscacha
Vulture
Walrus
Wapiti
Warbler
Wasp
Watersnake
Water-spider
Water-thrush
Wax-insect
Weakfish
Weasel
Weaver-bird
Weevil
Whale
Whippoorwill
Wildcat
Wolf
Woodpecker
Wood-rat
Worm
Wren
Yak
Zebra

Mind in Animals.

The intelligence and mental processes of animals are subjects to which much attention has been paid recently, and facts bearing upon them are eagerly sought. Some of the conclusions of students will be found in the following:

Ant
Nervous System, Evolution of the
Habit
Instinct
Social Insects (under Insect)
Orientation

Distribution of Animals.

Everyone is aware that different parts of the earth's surface have different faunas, and that this condition apparently remains permanent, except when, by means of civilization or commerce, certain animals are enabled to spread beyond their natural habitat, and even become cosmopolitan, as have rats, house-mice, the European house-sparrow, and a large number of plant-feeding insects. Normally one fauna does not enlarge or diminish at the expense of another, and, for the most part, species of animals, as of plants, are restricted to a comparatively small range and set of climatic conditions. The local faunas, both on the land and in the sea, have been examined, and their boundaries well ascertained. It has been found, however, that groups of related faunas

exist side by side, which may be composed into large divisions called "subregions," and these into a few still larger ones called "regions." The natural barriers which are set to the dispersion of animals, and the finding of the actual boundaries of the faunal districts, form the outlines of the highly interesting study of the geographical distribution of animal life, past and present. To acquaint himself with this science, the reader should peruse the following co-related articles:

Distribution of Animals
Fauna
Ethiopian Region
Paleotropical Region
Holarctic Region
Nearctic Region
Oriental Region
Palearctic Region
Deep-sea Exploration
Pelagic Animals
Plankton

See also the names of the various subregions, as NEW ZEALAND SUBREGION, MALAGASY SUBREGION, etc.; the paragraphs on *Fauna* under the names of the various continents and countries, as AMERICA, AUSTRALIA, BRAZIL, and the like; and, for the distribution of animals in past ages, PALEONTOLOGY, EXTINCTION OF SPECIES and MIGRATION OF ANIMALS.

RELATIONSHIP.

The relationship of animals toward others, and to the environment of each individual, species, or group, forms a feature of far-reaching importance and of great interest in zoology, and the study of the facts involved has been set apart as a science under the name of BIONOMICS. Much relating to it will be found in the descriptive articles cited under Habits and elsewhere, but special consideration is given under the succeeding heads:

Bionomics
Cave Animals
Environment
Estivation
Flowers and Insects
Hibernation
Social Insects (under Insect)
Natural Selection
Orientation
Parasite
Symbiosis
Tropism

The relations between man and the lower animals are mainly those of warfare or service. Animals are in the way of his operations or dangerous to him, and must be got rid of, or supply him with flesh, or hide, or fur, or some other desirable thing, which can be obtained, in most cases, only by killing them; or they attract him to the chase and to such sports as angling and shooting. Hence, many are sought only to be killed, and some species have been entirely exterminated. On the other hand, his agricultural operations have encouraged the spread and development of some, as various insects, rats, etc., in a remarkable way. A third class has been utilized by domestication and turned to his service and benefit. Some articles of special moment in the Encyclopædia dealing with this sporting and economic aspect of natural history are these:

Acclimatization
Angling
Bee
Buffalo

Domestic Animals (and the various kinds, as Camel, Cat, Dog, Horse, Sheep, Fowl, etc.)
Extinct Animals
Falconry
Fish as Food
Fish Culture
Fisheries
Fishing
Fur and the Fur Trade
Game Laws
Game Preserve
Insects, Propagation of Disease by
Introduced Species (especially of injurious insects, such as those described under Bollworm, Cutworm, Chinch-bug, Pear Insects, etc.)
Mosquito
Oyster
Pearl
Prairie Dog
Rabbit
Seal
Silkworm
Taxidermy

METHODS OF STUDY.

The methods of study in natural history are described to some extent in the articles:

Deep-sea Exploration
Laboratory
Microscope
Morphology
Nature-Study
Psychological Apparatus
Zoölogical Garden
Zoölogical Station

CLASSIFICATION OF ANIMALS.

Turning now from the methods and facts of observation and experiment to the philosophical deductions,—the principles and theories drawn from these facts,—the reader will first need to attend to the subject of classification, which has been slowly developed through a long series of errors and limitations and gradually corrected in the brightening light of growing knowledge. The history of this search for the true, because natural, classification may be found in the articles ANATOMY, CLASSIFICATION OF ANIMALS, and ZOÖLOGY, with the names of the men who from time to time notably advanced taxonomy, and whose biographies may be read. No real success was achieved until the modern conviction was arrived at, that the key to the problem of classification was to be found in community of descent, and that any true classification must follow the perception of genetic relationship —descent from a common ancestor. This is the basis of modern classification, and what we have approaches perfection in just the degree that the phylogeny of each group is rightly apprehended. As a result of the constant increase of knowledge, the arrangement of this group and that is constantly being modified and presumably always improved. From time to time, these amendments are gathered up and critically combined into a general scheme. The latest such scheme of classification of the whole animal kingdom, which is authoritative and at the same time generally accessible, is that contained in Parker and Haskell's *Text-book of Zoölogy*, and this has been followed in respect to the general outline in this Encyclopædia, insuring uniformity. For further details, consult:

Classification of Animals
Phylogeny

Variation
Type
Zoology

For the classification of separate groups, see their titles, as CŒLENTERATA, CRUSTACEA, MOLLUSCA, ECHINODERMATA, etc.

ZOÖLOGY AND EVOLUTION.

The philosophical part of zoology has been developed since man began to observe the ways of nature, and has produced a vast body of "laws," doctrine, and speculation, the history of which is sketched in such general articles as ANATOMY, ZOÖLOGY, EVOLUTION, etc., and the biographies of the great thinkers cited should be read in connection with their themes. Science has constantly tended to separate itself from metaphysics, and to use its hypothesis merely as a means for further investigation of phenomena. The outcome has been the formulation and general acceptance of a theory of universal development from the simple to the complex, from the homogeneous to the specialized; and Organic Evolution or the Doctrine of Descent is the application of the general principle to the history and phenomena of living things. A reader who wishes to acquire a knowledge of these views of nature may do so by reading in consecutive order the articles named below:

Biology
Evolution
Ontogeny
Phylogeny
Natural Selection
Lamarckism
Growth
Heredity
Hybridity
Mendel's Law
Extinction of Species

Guided by these articles and the cross-references to be found in them, he may pursue the subject under other fruitful titles, such as:

Botany
Chromosomes
Cross-fertilization
Degeneration as a Factor in Evolution
Embryology
Environment
Flowers and Insects
Isolation
Kinetogenesis
Longevity
Mechanics of Development
Mimicry
Neo-Darwinism
Neo-Lamarckism
Otter Sheep
Pollination
Polymorphism
Protective Coloration
Recognition Marks
Regeneration
Reversion
Senescence
Sex
Sexual Selection
Use-Inheritance
Variation
Warning Coloration
Weismannism

BIOGRAPHY.

Only a name or two has been quoted in the preceding analysis of the science of zoology. The investigators in the field have been numerous, and the following list should be regarded as selected rather than complete. See:

Agassiz, L.

Audubon, J. J.
Baer, K. E.
Baird, S. F.
Balfour, F. M.
Barry, M.
Bates, H. W.
Beecher, C. E.
Bennett, J. H.
Bichat, M. F. X.
Blumenbach, J. F.
Bory de Saint Vincent, J. B.
Burbank, L.
Burmeister, H.
Camper, P.
Carus, K. G.
Castelnau, F.
Clark, H. J.
Cope, E. D.
Coste, J. V.
Cuvier, G. L. C.
Dana, J. D.
Darwin, C.
Davenport, C. B.
Degeer, K.
Dohrn, A.
Du Bois-Reymond, E. H.
Dujardin, F.
Eimer, T.
Eschscholtz, J. F.
Fleming, J.
Flourens, M. J. P.
Forel, A.
Galton, F.
Gay, C.
Gegenbaur, K.
Geoffroy Saint-Hilaire, E
Gesner, K.
Goode, G. B.
Gould, A. A.
Gould, J.
Graaf, R. de
Green, S.
Haeckel, E.
Haller, A.
Harvey, W.
Hertwig, O.
Hertwig, R.
Huber, F.
Humboldt, A.
Hunter, J.
Huxley, T. H.
Hyatt, A.
Jordan, D. S.
Kölliker, A.
Lamarck, J. B.
Lang, A.
Lankester, E. R.
Le Conte, L.
Le Conte, J. E.
Le Conte, J. L.
Leeuwenhoek, A.
Leidy, J.
Lesueur, C. A.
Leuckart, R.
Levaillant, F.
Leydig, F.
Linnæus, C.
Loeb, J.
Lubbock, J.
Lyonnet, P.
Malpighi, M.
Marsh, O. C.
Mendel, G. J.
Mivart, St. George
Müller, J.
Müller, J. F. T.
Orbigny, A. D. d'
Osborn, H. F.
Owen, Richard
Packard, A. S.
Pallas, P. S.
Perty, J. A. M.
Ray, J.
Réaumur, R. A. F.
Reimarus, H. S.
Romanes, G. J.
Ross, A. M.
Roux, W.

Schleiden, M. J.
Schultze, M. S.
Schwann, T.
Sedgwick, W. T.
Semper, K.
Siebold, K. T. E.
Spallanzani, L.
Spencer, H.
Swammerdam, J.
Tschudi, J. J.
Vries, H. de
Wagner, M.
Wallace, A. R.
Weismann, A.
Wilson, A.
Wyman, J.

28. Manufactures and Engineering

THE development of manufacturing industries has resulted from more efficient economic organization, and from the perfection of technological processes involving the application of scientific discoveries and knowledge. Accordingly, the most profitable method of study is first to consider the development of manufactures in general from the economic standpoint, and especially of the Factory System, where concentration permits of manufacture in increased quantities at diminished expense. This will be found treated in the articles on FACTORIES and MACHINERY, ECONOMIC EFFECTS OF, in which is traced the growth of manufacturing in general. For specific industries, reference should be made to the separate articles, as the historical and statistical development of any given industry is best considered by itself, on account of the important relation that it bears to practical questions of material, processes, and the like. This brings us straightway to the leading question how things are made, which it is an important function of an encyclopædia to answer. In this is involved the gathering and preparation of the raw material, the manufacture, the finishing, and the distribution, or utilization, of the finished product. There are prepared below a number of lists of subjects, more or less cognate, dealing with manufacturing industries and their products, and, by carefully observing the cross-references, a complete idea of the more important processes may be gained.

A. Manufacturing Processes

FOOD AND MANUFACTURE OF FOOD STUFFS, ETC.

An important field of manufacturing operations is that concerned with the preparation of food stuffs, both in the factory and on a less extensive scale in the home. COOKERY; FOOD, PRESERVATION OF; SLAUGHTER HOUSES; and PACKING INDUSTRY are titles that suggest the wide range of subjects that may be grouped under such a head. The following list indicates appropriate titles:

Meat
Slaughter Houses
Packing Industry
Food, Preservation of
Digester
Extract of Meat
Ham
Lard
Tallow
Pemican
Jerked Beef
Cookery
Wheat
Flour
Baking
Bread
Biscuit
Baking Powder
Butter
Cheese
Guarana
Macaroni
Sugar
Sardine

Gelatin
Confectionery
Chocolate
Cocoa Butter
Chewing Gum
Macaroon
Condiments
Pickles
Chutnee
Curry Powder
Olive Oil

FERMENTED AND DISTILLED LIQUORS.

The manufacture of BEER, WINE, and LIQUORS involves many interesting processes in chemical technology. A convenient beginning may be made by considering the history of fermented and distilled liquors, and the extent to which they are manufactured and consumed. Then, taking up the general properties of beer, wine, and distilled liquors, a classification of these beverages can be made, and the essential features of their production learned. Further details appropriate to the manufacture are discussed under BREWING, STILL, BOTTLING AND BOTTLING MACHINERY, while questions involving the chemistry of the subject are treated under FERMENTATION, DISTILLATION, and ALCOHOL. The physiological effects of alcohol are not only interesting, but instructive, and are properly considered in connection with the manufacture of alcoholic beverages. For a comprehensive study of the whole subject, the following articles should be consulted:

Liquors, Fermented and Distilled, Statistics and History of
Alcohol
Alcoholometry
Hydrometer
Alcohol, Physiological and Poisonous Action of
Fermentation
Brewing
Beer
Wine
Currant Wine
Distilled Liquors, or Ardent Spirits
Distillation
Brandy
Apple Brandy
Rum
Whisky
Fusel Oil
Geneva
Gin
Liqueur
Absinthe
Benedictine
Chartreuse
Curaçoa
Kirsch
Kümmel
Maraschino
Ratafia
Noyau
Bishop
Cider
Berlin Spirit
Bottling and Bottling Machinery

FIBRES AND TEXTILES.

The subject of fibres and textiles is one of novel scope and, for its proper comprehension, requires first the consideration of the fibres themselves and how they are produced and prepared for manufacture. The chief vegetable fibres are;

Cotton
Flax
Hemp
Jute
Linen
Hemp, Manila

Ramie
Coir
Cotton, Artificial
Wood Pulp Yarns
Silk
Silk Worm
Floss Silk
Organzine
Wool
Wool and Worsted Manufactures
Sheep
Noils
Shoddy

It is next advisable to consider the processes by which the fibres are prepared for spinning and weaving. These processes are discussed in the following articles:

Cotton-Gin
Heckle
Carding
Spinning
Yarn

Textile manufacturing comprises industries of many diverse characters, which employ complicated machinery. As they have a certain amount of similarity, and bear some relation to each other, the processes of making the various fabrics may first be considered together. The first step is the designing of the fabric, in which the weaves, patterns, and designs are made on the LOOM. This naturally involves the discussion of WEAVING, which should explain the fundamental weaves and the methods by which patterns are produced. Therefore, in this connection, the following articles should be consulted:

Textile Manufacturing
Textile Designing
Weaving
Loom
Heddle
Bobbin

Crocheting and knitting differ essentially from weaving and, whether performed by hand or machine, are the means of producing garments and other useful articles. The following titles indicate the articles to be consulted on these subjects:

Crochet
Knitting
Hosiery

Either the yarn or the finished fabric may be dyed, or the latter may be printed, in order to impart colored designs to it. In either case, complex and interesting processes are involved, which are described in the list below:

Dyeing
Coal-Tar Colors
Vegetable Colors
Indigo
Turkey Red
Textile Printing
Beetling
Calendering
Bleaching
Bleaching-Powder
Embroidery

The finished textile fabrics are almost infinite in their variety. It is possible to select the more important and the representatives of the leading classes and study them in detail. Such a list arranged alphabetically is as follows:

Art Square
Bandana
Barege
Batiste
Blanket
Bobbinet

Bolting-Cloth
Bombazine
Brocade
Brocatel
Brussels Lace
Buckram
Bunting
Cambric
Camel's Hair
Camlet
Canvas
Carpet
Cassimere
Chenille
Chintz
Corduroy
Crape
Cretonne
Crinoline
Damask
Diaper
Dimity
Dornick
Drugget
Duck
Felt
Flannel
Floor-Cloth
Fustian
Galloon
Gauze
Gingham
Grass Cloth
Gunny
Haircloth
Huckaback
Kersey
Lace
Linen
Matting
Mercerized Cotton
Mohair
Moire
Moleskin
Muslin
Nankeen Cloth
Nets
Oilcloth
Piña Cloth
Plush
Poplin
Rugs
Satin
Silk
Taffeta
Tapestry
Tarlatan
Tweed
Velvet

Leather and Leather Manufactures.

The various processes for the manufacture of Leather are described under that title, and the finished products, such as boots, shoes, saddlery, etc., in which independent industries participate, are appropriately grouped by themselves. For leather and leather goods, the following list is recommended:

Leather
Bark
Tanning (under Leather)
Buckskin
Glove
Buff Leather
Cordovan
Shagreen
Chamois
Leather Cloth
Saddlery
Boot
Shoes
Blacking

Carriages and Other Vehicles.

From the primitive ox-cart to the

modern motor vehicle in its numerous forms for business and pleasure is a long step, and it includes the development of many vehicles that have wrought important economic and social changes, involving new and improved road construction. These are represented in the following list:

Cart
Chariot
Carriage
Coach
Driving
Coupé
Hansom Cab
Wagonette
Buckboard
Phaeton
Ambulance
Bicycle
Automobile
Motor Vehicle
Motor Cycle
Side Car

Ceramic Industries.

Clay affords the fundamental material for numerous products used in industry and also for works of art. From its geology to its decorative application many interesting processes are involved, and the reader will find the subject well covered in the New International Encyclopaedia. It is recommended that at the outset the article Clay be studied, followed by those on the accompanying list which discuss rather the industrial uses as somewhat distinct from the mere artistic, as contained in the next following section:

Clay
Kaolin
Kiln
Fire Brick
Fire Clay
Pipe Clay
Pottery
Tile
Terra Cotta
Fireproof Construction

Porcelain and Pottery.

There are few more interesting studies than that of porcelain and pottery, and, if the processes are traced from the production of the clay until the finished piece emerges from the kiln after the final firing, the reader will be well repaid. For this purpose the following articles are recommended:

Pottery
Porcelain
Biscuit
Kiln
Annealing
Ceramic
Enamel
Bow China
Burmese Ware
Vase
Cracklin
Stoneware (under Delft)
Delft Ware
Eggshell China
Faïence
Jasper Ware
Majolica
Terra Cotta
Tile
Pyrometer

Glass.

Few materials are more extensively employed in the arts than glass, and in scientific work and in decoration it also holds an important place. For the es-

sential features of its manufacture, the comprehensive and general article GLASS should be consulted, while the subordinate topics, as listed below, should be read in this connection:

Glass
Flint Glass
Crown Glass
Iridescent Glass
Water-Glass
Wire Glass (under Glass)
Bottle
Carboy
Prince Rupert's Drops
Bologna Vial
Lens
Mirror
Lorraine Glass
Stained Glass
Gems, Imitation

HOROLOGY.

The construction of various instruments for keeping time is a science of considerable antiquity, and its various departments may be studied with profit. A convenient arrangement of titles is given below:

Horology
Clock
Watch
Clepsydra
Dial
Hour-Glass
Balance
Escapement
Fusee
Pendulum
Isochronism
Chronoscope
Chronograph
Time, Standard
Time Signals

PRINTING, TYPOGRAPHY, ENGRAVING, PAPER, ETC.

The development of the art of printing has brought about many connected processes and industries. These are concerned with the impression on paper of letters or designs in one form or another, or the provision of the apparatus and machinery to do this, as well as the material to receive the impression. An arrangement of such subjects is as follows:

Printing
Case
Type Founding
Typesetting Machines
Electrotyping (under Electro-Chemistry, Industrial)
Bank Notes, Manufacture of
Engraving
Photo-Engraving
Three-Color Process
Lithography
Rotogravure
Ink
India Ink
Graphotype
Paper
Parchment
Parchment, Vegetable
Cardboard
Bristol Board
Cartridge-Paper
Calendering
Bookbinding
Envelope
Pen
Fountain Pen (under Pen)
Pencil
Typewriters
Copying Machines
Sealing-Wax
Ruling Machine

MISCELLANEOUS INDUSTRIES AND PRODUCTS.

Bead
Bell
Blacking
Bristles
Brush and Broom
Button
Candle
Celluloid
Coal-Tar
Coke
Comb
Cooperage
Cork
Corset
Cosmetics
Doll
Embossing
Excelsior
Fan
Flowers, Artificial
Gems, Imitation and Artificial
Gilding
Gimp
Glove
Glue
Gold Lace
Grease
Gutta-Percha
Ivory
Ivory, Vegetable
Japanning
Jewelry
Lac
Lacquer-Work
Lapidary Work
Laundry Machinery
Linoleum
Lumber Industry
Mangle
Matches
Needle
Ormolu
Papier-Maché
Pen
Pencil
Perfumery
Petrolatum
Pin
Poppy-seed Oil
Pyrotechny
Rope
Rubber
Sawdust
Sewing Machine
Silkworm Gut
Straw Manufactures
Tableware, Silver-Plated
Tobacco Pipe
Vacuum Cleaners
Varnish
Voting Machine

MINING AND METALLURGY.

In addition to general articles on MINING and METALLURGY, there will be found, under the various metals, articles dealing not only with their occurrence and general properties, but also with their mining and metallurgy. Such articles are included in the following list:

Mining
Metallurgy
Iron and Steel
Copper
Gold
Silver
Nickel
Zinc
Platinum
Lead
Tin
Antimony
Manganese
Mercury
Aluminium

Cobalt
Molybdenum
Litanium
Tungsten
Uranium
Vanadium

Looking, however, at special methods of mining and metallurgy, there are general articles which have reference to the more common metals and the methods of producing and refining them. These articles are as follows:

Mining
Mines and Mining in Law
Blasting
Explosives
Mine Accidents
Assaying
Metallurgy
Metallography
Calcining
Crucible
Ore Dressing
Roasting
Chloridizing
Chlorination
Refining of Metals
Electro-Chemistry
Electric Furnace

Although considerable material on metal working is given under the metals themselves, there are certain processes which can be described in special articles. These include the following:

Founding
Forge, Forging
Anvil
Welding
Tempering Steel
Annealing
Dies and Die-Sinking
Damaskeening
Brazing
Rolling Mill
Grinding and Crushing Machinery
Mint
Draw-Plate
Electro-Plating
Metal-Working Machinery

For many purposes, alloys are more useful than simple metals. These are discussed under their own heads, as well as in a collective article, while other preparations of metal, as GALVANIZED IRON and STEEL WOOL are also treated. A list of such articles is as follows:

Alloy
Alloys Magnetic
Brass
Bronze
Babbitt Metal
Fusible Metal
Coinage
Pinchbeck
Solder
Flux
Galvanized Iron
Steel Wool

The ornamental working of metals into small objects is also to be considered, and there are a number of articles which treat the subject from the artistic as well as the practical side. These titles include:

Jewelry
Plate, Sheffield
Tableware, Silver-Plated
Gold-Beating
Gold-Beater's Skin
Repousée
Enamel
Embossing

B. Construction

BUILDING AND BUILDING MATERIALS.

The materials used in building embrace natural and artificial substances which are specially wrought for the purpose. Whether we start with the lumber from the forest or the stone of the quarry, we find that there are a number of processes which have to be gone through before the material is finally disposed of in its appointed place. Considering first the materials for building, together with their sources, the following list has been constructed:

Building-Stone
Quarry, Quarrying
Stone Cutting and Dressing
Stone, Artificial
Clay
Brick
Mortar
Kiln
Cement
Concrete
Terra Cotta
Tile
Gypsum
Lumber Industry
Factor of Safety
Strength of Materials

For a study of the process of BUILDING, the article under that title will furnish an adequate idea. The separate branches, however, require more extensive treatment, as the following topics will suggest:

Building
Carpentry
Cabinet Work
Foundation
Masonry
Brick Work
Fireproof Construction
Steel Skeleton Construction
Half Timber
Plaster, Lathing and Plastering
Heating and Ventilation
Plumbing
Elevator
Paper-Hangings
Painting
Illumination
Gas, Illuminating and Fuel
Electric Lighting

For certain forms of building, such as APARTMENT HOUSES and HOTELS, somewhat different equipment is required, and these are discussed under their own heads. For building operations in general, there are a number of minor topics that require a separate treatment. These may be included in the following list:

Centring
Chimney
Door
Window
Framing
Column
Girder
Beam
Brace
Roof
Gutter
Lightning, Protection from
Lock
Alarm
Fire-Escape
Calcimine
Heating and Ventilation

C. Engineering

The constantly broadening field of engineering endeavor has resulted in dividing the work, so that to-day an engineer adopts but a comparatively small field for his own activity. Under ENGINEER AND ENGINEERING will be found a description of the modern divisions of engineering work and the qualifications of the men that follow each branch. In civil engineering, first may be mentioned the surveyor.

SURVEYOR.

Surveying involves the measurement of distances and areas and the delineation of the territory examined. It is carried on in different ways, depending on the extent and character of the country under survey. The following shows the general division of topics:

Surveying
Coast and Geodetic Survey
Geological Survey
Geodesy
Triangulation
Isostasy
Deflection of the Plumb Line
Hydrography
Dredge
Sound, Sounding
Photographic Surveying
Altimetry
Hypsometry
Leveling
Offset
Map
Engineering Instruments
Theodolite
Plane-Table
Stadia
Telemeter
Vernier
Sextant
Compass, Solar
Planimeter
Range-Finder
Aneroid
Heliograph
Odometer

RAILWAYS.

After a general and comprehensive review of the subject of RAILWAYS in the article of that title, particular parts require somewhat fuller treatment, involving, as they do, engineering and other features of a unique character. For this purpose, the following list is supplied:

Railways
Street Railway
Urban Railways
Electric Railways
Ship Railway
Locomotive
Compressed-Air Locomotive
Tunnel
Bridge
Cantilever
Viaduct
Culvert
Gauge
Frog, Railway
Fish Plate
Block-Signal System
Air Brake
Buffer, Buffing Apparatus
Bumping Posts
Snow-Plow

RIVER AND HARBOR IMPROVEMENTS.

Various important works to aid maritime commerce consist in the erection of numerous harbor and river im-

provements. These are of a permanent character and require special engineering. Such works are described in the list below:

Lighthouse
Buoy
Jetty
Breakwater
Embankments
Cofferdam
Foundation
Dike
Harbor
Dredge
Levee
Dock
Pile
Excavating Machinery
Blasting
Caisson
Masonry
Retaining Walls
Quay

CANALS.

When canals are carried across an isthmus, as at Suez or Panama, they may involve also many of the essential characteristics of harbor improvements; yet such works show considerable variation, and, when ordinary inland canals or those in connection with an irrigation system are considered, the methods of construction are quite different. The following list suggests a line of topics that could with profit be consulted:

Canal
Irrigation
Panama Canal
Nicaragua Canal
Suez Canal
Corinth Canal
Erie Canal
New York State Barge Canal
Cape Cod Canal
Saint Mary's Canal
Welland Canal
Chicago Drainage Canal
Trans-Isthmian Canal
Ship Railway

WATERWORKS AND HYDRAULIC ENGINEERING.

The use of water practically involves a separate department of engineering, but one in contact at many points with civil, sanitary, mechanical, and electrical engineering. It is necessary first to consider WATER SUPPLY, or the sources of water, then its storage, transmission, purification, distribution, and final consumption, and also various devices that are employed in these different stages. The material on this subject in the *New International Encyclopædia* is represented in the following list:

Water Supply
Hydrography
Well-Sinking
Artesian Wells
Dams and Reservoirs
Hydrostatics
Hydrodynamics
Current-Meter
Weir
Irrigation
Pipe
Water Purification
Water-Works
Fire Protection
Pumps and Pumping Machinery
Valve
Water Power
Filter and Filtration
Accumulators
Hydraulic Ram
Water Wheel and Turbines

Hydraulic Press
Archimedes' Screw
Danaide
Hydraulic Pressure Engine
Water Meters
Hydraulic Elevator (under Elevator)

SANITARY SCIENCE.

Under this somewhat comprehensive title, may be included such schemes as tend to improve and safeguard the health of mankind. See:

Hygiene
Diet
Occupational Diseases
Schools, Medical Inspection of
Health, Boards of
Sanitary Commission
Sanitary Laws
Quarantine
Water Supply
Water-Works
Water Purification
Plumbing
Garbage and Refuse Disposal
Sewage Disposal
Sewerage
Disinfectants
Drainage
Catch-Drains
Heating and Ventilation
Bath-Houses, Municipal
Slaughter Houses
Burial
Cemetery
Cremation of the Dead
Health Association, American Public

MUNICIPAL ENGINEERING.

The various applications of engineering knowledge to a large city result in the solving of many problems, such as water supply, transportation, the provision of PARKS and PLAYGROUNDS for the masses, etc., and especially the fundamental ones involved in CITY PLANNING, which are now engrossing the attention of many American cities. These subjects, grouped from this point of view, will be found in the following list:

City Planning
Road
Street
Boulevard
Road and Street Machinery
Asphalt
Pavement
Subways
Electric Railways
Street Railways
Urban Transportation
Water-Works
Illumination
Electric Lighting
Parks and Playgrounds
Landscape Gardening
Recreation Piers
Bath-Houses, Municipal
Garbage and Refuse Disposal
Municipal Ownership
Public Utilities

See also preceding section on Sanitary Science.

FIRE PROTECTION.

The surest fire protection is FIREPROOF CONSTRUCTION for buildings, seen at its best in STEEL SKELETON CONSTRUCTION, where combustible material is reduced to a minimum. Then there are SAFES AND SAFE DEPOSIT VAULTS for valuables, and the use of INCOMBUSTIBLE FABRICS. When these safeguards are unavailing, however, recourse must be had to the various apparatus for fighting fire, such as the

FIRE-ENGINE, now seen in its self-propelled form, the motor fire-engine, the high pressure pumping service, the FIRE-EXTINGUISHER, etc. See:

Fireproof Construction
Safes and Safe Deposit Vaults
Fireproofing
Incombustible Fabrics
Fire-Alarm
Fire Protection, Municipal
Fire-Engine
Fire-Extinguisher

MECHANICAL ENGINEERING.

For raising and transporting materials, and for carrying on other important operations, many interesting mechanical devices are constructed. The CABLEWAY, TELPHERAGE, DERRICK, and TRAVELING SIDEWALK are typical of the former class, while GRINDING AND CRUSHING MACHINERY and AIR COMPRESSOR may be cited as divisions of the many branches of mechanical engineering. A list of such subjects as are not already cited under other heads includes:

Derrick
Crane
Cableway
Telpherage
Ropeway
Traveling Sidewalk
Elevator
Air Compressor
Blowing-Machines
Pneumatic Dispatch
Power, Transmission of
Dynamometer
Brake
Prony Brake
Air Brake
Lubricants
Wood-Working Machinery

MECHANICAL DEVICES.

In the construction of machinery there are certain elementary parts that enter into its design. These serve such purposes as changing the direction of a motion, increasing or reducing speed, or permitting its control in any desired way. See:

Mechanical Powers
Axle
Shafting
Wheel and Axle
Lever
Pulley
Crank
Cam
Eccentric
Winch
Windlass
Inclined Plane
Wedge
Toggle Joint
Screw
Endless Screw
Belt
Gear-Wheel
Gearing
Couple

PRIME MOVERS.

For the generation of power there are a number of sources to be considered. HEAT, STEAM, ELECTRICITY, WATER POWER, WIND, etc., are all treated in their proper places, but under this head may conveniently be included articles describing the means for transforming energy into mechanical power available for a thousand and one different purposes. See:

Hot-Air Engine
Compressed-Air Engine
Compressed-Air Locomotive
Gas-Engines

Internal-Combustive Engines
Motor Vehicle
Fireless Engine
Steam Engine
Steam Turbine
Water Wheel
Windmill
Hydraulic Ram
Hydraulic Press
Hydraulic-Pressure Engine
Dynamo-Electric Machinery
Mechanical Powers

STEAM AND STEAM ENGINE.

Commencing with a consideration of the properties of steam, any discussion soon reaches the STEAM ENGINE and its various parts and its applications. Such will be found in the classification given below:

Steam
Boiler
Economizers
Shaking Grates
Æolipile
Steam Engine
Locomotive
Steam Navigation
Steam Turbine
Pumps and Pumping Machinery
Eccentric
Crank
Fly-Wheel
Governor
Valve
Injector
Indicator
Safety Valve
Condenser
Horse-Power

ELECTRICAL ENGINEERING.

In Electrical Engineering, we may include the generation and distribution of electric current, also its use for light and power, and the methods by which it is transmitted to considerable distance. The subject is treated in the following articles:

Dynamo-Electric Machinery
Armature
Cable, Electric
Transformer
Synchronizer
Transmission of Power
Electric Lighting
Electric Furnace
Electric Heater
Electric Railways
Urban Transportation
Electro-Chemistry
Storage Battery
Electrolysis
Welding
Lightning-Arresters
Electric Fuze (under Fuze)

For a discussion of the phenomena of the electric current, see the comprehensive section on Electricity in the chapter on Physics.

TOOLS.

Many and varied tools have been and are used by the mechanic, which are discussed in the articles dealing with the various industries. Certain groups and individual tools, however, demand consideration. Thus, METAL and WOOD-WORKING MACHINERY include many important tools, the chief types of which it is desirable to understand. PNEUMATIC TOOLS have resulted in considerable saving of labor and are of increasing importance. Many tools, such as the file, hammer, and axe, still survive and are not yet

replaced by machinery. The list in alphabetical order is as follows:

Axe
Boring Machinery
Calipers
Cutlery
Drill
File
Hammer
Jack
Mandril
Marlinespike
Metal-Working Machinery
Micrometer
Plane
Pneumatic Tools
Sand Blast
Sandpaper
Saw
Sawmill
Screw
Wood-Working Machinery

TELEGRAPH AND TELEPHONE.

The transmission of intelligence is constantly being accomplished more effectively and by a greater variety of methods, specialization having its play here as in other branches of applied electricity. The following articles may be recommended as supplying a complete idea of the history and development of these important processes:

Telegraph
Signaling and Telegraphing, Military
Lightning-Arresters
Telautograph
Telegraphy, Submarine
Atlantic Telegraph
Wireless Telegraphy
Telephony
Coherer
Telephone

Chapter 29. Efficiency and Industrial Management

WHILE few terms have been more abused in recent years than the word "Efficiency," which may be interpreted all the way from implying some occult science for making two blades of grass grow where one or even less previously flourished, to some simple means for securing greater output of a factory or business, it may be understood, however, in its strictly technical sense, as the ratio of the actual to the possible, or output to input. In such studies are involved much that can result and be interpreted to the advantage of mankind, so that in mathematical language a condition will be realized where this ratio will approach nearer to unity. For true efficiency there must be a knowledge both of the actual and the possible, expressed exactly and quantitatively, and then the employment of various means to eliminate waste and lost motion, so that the enterprise shall be more productive and yield greater returns, both gross and net. To accomplish this there are various methods, differing as to their manner and as to the claims advanced for their merits and workability, yet essentially the same if examined as regards their psychological and philosophical fundamentals.

Accordingly, when one investigates the subject of SCIENTIFIC MANAGEMENT he must first learn its objects and then appreciate wherein it is scientific, and then determine the various methods and schools of thought that have developed to secure these objects. Therefore, the student in this field should consult the fundamental articles on EFFICIENCY and INDUSTRIAL MANAGEMENT, but he will find also that in addition he will be required to inform himself as regards BOOKKEEPING and ACCOUNTING, for all studies in this field must depend upon records and bear a relation to the final system of accounts and values that show the profit of the enterprise. Accordingly, one might suggest the following list of titles that develop this interesting field of modern thought:

Efficiency
Industrial Management
Scientific Management
Legislative Management
Premium Plant
Motion Study
Time Study
Task and Bonus
Unit System

The articles BOOKKEEPING and ACCOUNTING, previously mentioned, should be read and also that on RAILWAYS, where, in the case of American railways, there has been much dispute as to the degree of efficiency that is secured in their operation, the principles of scientific management being designed to find application here if anywhere.

30. Military and Naval Science

AS the purpose of an army or any military organization is to carry on, or at least be prepared to carry on, war, either of defense or of offense, as effectively as possible, a study of the topic WAR, to ascertain under what circumstances recourse is had to the court of arms and under what conditions the laws and usages of nations demand that war shall be waged, makes a fitting beginning for reading in this field. Then, coming to the actual operations of war, we find that they must be planned according to the principles of STRATEGY and executed along lines worked out in systems of TACTICS. Accordingly, then, a suitable grouping of allied subjects is as follows:

A. Armies

War
Strategy
Tactics, Military
Military Aeronautics
Attack
Assault
Fire
Battle
Engagement
Skirmish
Invasion
Blockade
Fortifications, Attack and Defense of
Siege
Sap
Bombardment
Coast Defense
Manœuvres
Evolutions, Military
Demonstration
Marching
Manual of Arms
À Cheval Position
Ambuscade
Ambush
Debouching
Échelon
Enfilade
Feint
Point d'Appui
Retreat
Base of Operations
Advance Guard
Cavalry Screen
Outposts
Picket
Patrol
Guard
Main Guard
Rear Guard
Flank
Reconnaissance
Prisoner
Contraband of War

ORGANIZATION.

To carry out, however, any scheme of strategy and tactics involves an army whose effectiveness depends upon its organization. In the organization of an army, the INFANTRY, CAVALRY, and ARTILLERY, or LINE, must be considered. These are its prime essentials, together with its ENGINEERS, MEDICAL DEPARTMENT, COMMISSARIAT, Department of the QUARTERMASTER, SIGNAL CORPS, Bureau of Military Justice, or Judge Advocate's Department, its Pay Corps, GENERAL STAFF, and the vari-

ous other bureaus and departments upon the efficiency of which the successful organization and operation of a military body depend.

Looking at military organization from the point of view of the units of which an army is made up, we may start with the CORPS, and gradually proceed from one command to an inferior one, learning the function of each and its relation to the common whole. RANK AND COMMAND is the keystone of military organization. Over each body of men there must be an appropriate officer, and to learn his duties it is but necessary to consult the article on this subject. In addition to officers, there may be certain subordinate individuals who have peculiar or individual functions to perform; these too are best described under their own heads. The accompanying lists suggest the relation of many of these topics. Dealing first with the division which may be headed Armies and Army Organization, we find large and adequate treatment, the historical side here as well as elsewhere in the Encyclopædia being considered. The first group deals with the divisions of military organization, the second, entitled RANK AND COMMAND, with the individuals of all ranks that form an army. See:

(*a*) *Armies and Army Organization:*

Army Organization
Armies
Corps
Division
Brigade
Regiment
Battalion
Squadron
Company
Battery
Platoon
Detachment
Artillery
Artillery Corps
Artillery Train
Cavalry
Infantry
Mounted Infantry
Engineer Corps
Medical Department, United States Army
Medical Department, United States Navy
Ambulance
Hospital Corps
Signal Corps
General Staff
Staff
Military Police
Band, Military
Pioneer
Sharpshooter
Color-Guard
Reserve
Cadre
Contingent
Column
Militia
Landwehr
War, Department of
Horse Guards
Life Guards
United States Army (under United States)

(*b*) *Rank and Command:*

Field-Marshal
General
Lieutenant-General
Major-General
Brigadier-General
Colonel
Lieutenant-Colonel

Major
Captain
Lieutenant
Cadet, Military
Cadet, Naval
Adjutant-General
Adjutant
Aide-de-Camp
Commissary
Quartermaster
Paymaster
Surgeon, Military
Inspector-General
Chaplain
Contract Surgeon
Commander-in-Chief
Commandant
Field Officer
Ensign
Cornet
Non-Commissioned Officer
Color-Sergeant
Drum Major
Sergeant
Corporal
Gunner
Artificer
Drummer
Orderly
Private
Bombardier
Sentinel

MILITARY ENGINEERING.

To the military engineer are assigned many problems connected with the existence and operation of an army. He has to provide for its protection in both peace and war, which involves the construction of suitable barracks, camps, and fortifications, both temporary and permanent, and is besides required to study and delineate the country in which the troops live or operate. Naturally, the chief division to be made in the topics relating to this subject is FORTIFICATION, involving the construction of more or less permanent works, and Field Engineering, dealing with those of a more temporary character. See:

Engineering, Military
Fortification
Military Architecture
Battery
Bastion
Berm
Blockhouse
Caponiere
Casemate
Coast Defense
Embrasure
Epaulement
Traverse
Stockade
Enceinte
Frontier, Military
Trench, Military
Escarp
Gallery
Magazine
Martello Tower
Orillon
Abatis
Bill-Hook
Blindage
Barricade
Cheveaux-de-Frise
Fascines
Gabion
Approaches
Parallels
Siege and Siege Works
Demolition
Breach
Camp
Bridges and Docks, Military
Mines and Mining, Military

Redoubt
Retrenchment
Revetment
Redan

FORTS OF THE UNITED STATES.

With a description of the principles of Fortification and Military Encampments, or posts, may properly be included a description of such military posts of the United States as are of importance for one reason or another. These are included in the following list, and the articles give information as to their location, garrison, general characteristics, etc.

Fort Adams
Fort Bliss
Fort Canby
Fort Caswell
Fort Clark
Fort D. A. Russell
Fort Douglas
Fort Du Pont
Fort Ethan Allen
Fort Flagler
Fort Grant
Fort Greble
Fort Hamilton
Fort Hancock
Fort Howard
Fort Jay
Fort Keogh
Fort Leavenworth
Fort Logan
Fort McHenry
Fort McPherson
Fort Meade
Fort Monroe
Fort Morgan
Fort Myer
Fort Porter
Port Preble
Fort Riley
Fort Robinson
Fort Sam Houston
Fort Schuyler
Fort Sheridan
Fort Snelling
Fort Stevens
Fort Strong
Fort Terry
Fort Thomas
Fort Totten
Fort Trumbull
Fort Wadsworth
Fort Warren
Fort Washington
Fort Wayne
Fort William H. Seward
Fort Yellowstone
Columbus Barracks
Jefferson Barracks
Madison Barracks
Plattsburg Barracks
San Diego Barracks
Vancouver Barracks
Washington Barracks

ORDNANCE AND GUNNERY.

To carry on warfare, many weapons and resources have been placed at the disposal of the soldier. Such titles as ARTILLERY, ORDNANCE, EXPLOSIVES, AËROPLANES, SUBMARINES, GUNPOWDER, PROJECTILES, SMALL ARMS, naturally suggest themselves as principal topics. With them may be grouped the underlying science as embodied in BALLISTICS and GUNNERY, together with the other topics contained in the following list:

(*a*) *Artillery:*

Coast Artillery
Field Artillery
Horse Artillery
Mountain Artillery

Siege Gun
Guns, Naval
Rapid-fire Guns
Machine Gun
Mitrailleuse
Gardner Gun
Mortar
Howitzer
Air Gun
Pneumatic Gun
Submarine Gun
Ordnance
Ordnance Establishments
Cannon
Jacket
Bore
Calibre
Artillery Carriages
Gun-Carriage
Limber
Caisson
Small Arms
Carbine
Chassepôt
Arquebus
Bayonet
Pistol
Revolver
Target and Target Practice
Sword

(*b*) *Projectiles:*

Ammunition
Grape-Shot
Case-Shot
Canister
Carcass
Grenade
Bomb
Shrapnel
Rocket
Cartridge
Torpedo

(*c*) *Explosives:*

Gunpowder
Smokeless Powder
Dynamite
Nitroglycerin
Atlas Powder
Cordite
Lyddite
Maximite
Picric Acid
Dualine
Fulminates
Fulminate of Mercury
Fulminate of Silver
Pyrotechny
Primer
Fuze
Greek Fire
Charge
Matches

(*d*) *Gunnery:*

Ballistics
Range
Range-Finder
Aim
Charge
Plongée
Ricochet
Target and Target Practice
Target Practice, Naval
Proving Ground
Loading-Tray

(*e*) *Historic Cannon:*

Coehoorn
Columbiad
Demi-Cannon
Demi-Culverin
Falcon
Jingal
Mitrailleuse

UNIFORM AND EQUIPMENT.

Closely connected with the soldier's

and sailor's weapons are his Uniform and Equipment, the various insignia often being matters of considerable interest and curiosity to the layman. With these subjects, we may include allied topics as follows:

Military Insignia
Uniforms, Military and Naval
Aiguillettes
Bandolier
Busby
Canteen
Cartouch
Chevrons
Epaulet
Facings
Good Conduct Badges
Haversack
Helmet
Képi
Khaki
Kit
Knapsack
Spur
Sword

Military Ceremonies.

As a witness of various military ceremonies or other formalities, the layman comes in contact with certain other aspects of army and navy life. The more important of these will be treated under their respective heads. See the following:

Salutes
Feu-de-Joie
Dress Ship
Escort
Review
Inspection
Parade
Muster

Flags.

Flags of one kind or another, by reason of their histories and tradition and their special uses at the present time, play an important part in military and naval affairs. Besides being the emblem of the nation, they may also pertain to various organizations or individuals, as the colors of a regiment or the flag of an admiral. These will be understood on reference to the following articles, many of which are illustrated by colored plates:

Flag
Ensign
Colors
Guidon
Standard
Pennant
Jack
Union Jack
Flag of Truce
Signaling and Telegraphing

Historic and Special Military Organizations.

Military organizations in the past, as well as in the present, have been formed either for special purposes or under special auspices, or as independent commands. Some of the more famous classes of soldiers and historic military organizations are those included in the following list:

Artillery Company, Ancient and Honorable
Artillery Company, Honorable
Bashi-Bazouks
Beefeater
Bersaglieri
Black Watch
Cameronians
Carbineers
Chasseurs
Cohort
Coldstream Guards

Colonial Corps
Cossacks
Cuirassier
Dragoons (under Cavalry)
Equestrian Order
Fencible
Foot Guards
Francs-Tireurs
Fusiliers
Green Mountain Boys
Grenadier
Grenadier Guards
Guard
Guerrillas
Guide
Gurkhas
Highlanders
Honvéd
Horse Guards
Household Troops
Hussars
Janizaries
Lancer
Landsturm
Landwehr
Legion
Life Guards
Mamelukes
Minute Men
Mobiles, Corps of
National Guard
Phalanx
Rangers, Mounted
Rifleman
Rough Riders Association
Scots Greys
Sepoy
Sikhs
Spahis
Streltsi
Trainbands
Voltigeurs
Yeomanry
Yeomen of the Guard
Zouaves

MILITARY LAW.

For the government of the army there are certain statutes and regulations. International law in many of its aspects touches on the acts of armies in the field. Accordingly, a grouping of certain topics allied, though not necessarily logically connected, may be made as follows:

Military Law
Acts of Hostility
Allegiance
Armistice
Articles of War
Belligerent
Blockade
Booty
Bounty
Capitulation
Cartel
Cashiering
Casus Belli
Conscription
Contraband of War
Council of War
Courts Military
Declaration of War
Desertion
Discharge
Judge-Advocate
Judge-Advocate-General
King's Regulations
Martial Law
Military Commissions
Military Government
Military Law
Military Police
Military Prison
Neutrality
Posse Comitatus
Prisoner
Privateering

Prize
Prize Courts
Provost-Marshal
Ransom
Spy
Truce
War

MILITARY AND NAVAL EDUCATION.

The professions of the soldier and sailor require from beginning to end continual training, and from Academy to War College there are many studies to be pursued. Grouping those topics referring to the education of the soldier and sailor, we have the following list:

Army Schools
Artillery Schools
Cadet, Military, Naval
Military Geography
Cavalry and Light Artillery School
Military Education
Military Academy, U. S.
General Service and Staff College
Staff Colleges and Schools
War College
Naval Academy, U. S.
Naval Schools of Instruction
Naval Institute, U. S.
Discipline
Drill
Drill Regulations

MISCELLANEOUS.

The food for the soldier and his animals is discussed under RATIONS and FORAGE, and its mode of preparation under FIELD COOKING. The principal BUGLE AND TRUMPET CALLS that summon him to his duties are given with the music notes, and the DRUM and FIFE, which supply the field music, are also treated. Methods of RECRUITMENT in various countries, and also RETIREMENT, should be studied, while the PAY AND ALLOWANCES of the soldier must be considered in order to understand army conditions at home and abroad. An essential of modern military operations is the maintenance of communication between every part of an army and its base, or capital. This is the function of the SIGNAL CORPS, whose operations and apparatus are treated under SIGNALING AND TELEGRAPHING, MILITARY. In the event of casualties, the SURGEON and the MEDICAL DEPARTMENT, with its HOSPITAL CORPS, are called into requisition, protected as they are by the terms of the GENEVA CONVENTION. It is advantageous to learn the present conditions of SURGERY, MILITARY, and the peculiar problems that the military surgeon has to face, as well as his methods of operation. In this connection, also, should be mentioned the work of the RED CROSS, and the part it plays in alleviating suffering on the battlefield. Of importance, as in a small way reproducing some of the conditions of warfare, the WAR GAME is worthy of consideration, as on its board may be worked out many interesting problems in strategy and tactics.

B. Ships and Navies

No clearer distinction can be drawn in discussing vessels for navigating the seas than to consider separately those for military purposes and those for commerce, but it is not always possible to make the separation complete,

and many subjects concerning nautical affairs cover or apply to both classes. Under NAVIES and SHIP AND SHIPPING (subhead *Ship, Armored*) are given historical accounts of the development of war craft, while the evolution of the merchant ship is traced under NAVIGATION, SHIPBUILDING, and SHIP AND SHIPPING (subhead *Power Navigation*). In the following lists the different kinds of warships, merchantmen, and boats which are separately described under their own titles are collected under the proper head:

(*a*) *Warships:*

Warship
Ship, Armored (subhead under Ship and Shipping)
Battleship
Cruiser
Fuel Ship
Gunboat
Torpedo Boat
Torpedo Boat, Submarine
Hospital Ship
Ram
Guard-Ship
Receiving Ship
Galley
Galliot
Trireme
Fire-Ship
Floating Battery
Frigate
Monitor
Mortar Vessel
Corvette

(*b*) *Merchantmen:*

Ship and Shipping and its various subheads
Power Navigation (subhead under Ship and Shipping)
Clipper
Bark
Brig
Schooner
Sloop
General Ship
Composite Ships
Lighter
Whaleback
Yacht
Lugger
Junk
Grab
Dhow
Corsair
Ketch
Pinnace
Pirogue
Pram
Great Eastern
Launch, Launching
Derelict
Wreck

(*c*) *Boats:*

Lifeboat
Life-Rafts
Balsa
Launch
Whaleboat
Long Boat
Jolly-Boat
Punt
Cutter
Catboat
Canoe
Catamaran
Banca
Ice-Breaking Steamer
Barca
Kayak
Ferry

NAVIES, NAVAL AFFAIRS, ETC.

There is included under this head, in the following lists, articles pertain-

ing not only to the navy proper, but to such government services as are connected with naval and nautical affairs, such as Coast Guard, Life-Saving Service, etc.:

(*a*) *Organization and General Subjects:*

Navies
Tactics, Naval
Marine Corps
Engineer, Naval
Medical Department, United States Navy
Hydrographic Office
Navy, Department of the
Naval Academy
Naval Schools of Instruction
Naval College of Canada
Revenue Cutter Service, United States
Life-Saving Service
Coast Guard
Naval Reserve
Crew
Company, Ship's
Complement
Watch
Division
Landing Force
Billet
Mess
Pay and Allowances
Naval Reserve

(*b*) *Officers and Men:*

Admiral
Commodore
Captain
Commander
Lieutenant-Commander
Lieutenant
Ensign
Midshipman
Clerk, Paymaster's
Commanding Officer
Commandant
Flag-Officer
Executive Officer, United States Navy
Surgeon, Military and Naval
Paymaster
Watch Officer
Naval Constructors
Chaplain
Provost-Marshal
Pilot
Warrant Officer
Gunner
Master
Master-at-Arms
Mate
Carpenter, Navy
Boatswain
Machinist, Naval
Petty Officer
Quartermaster
Coxswain
Naval Apprentice
Landsman
Boys, Ships'

(*c*) *Naval Ordnance, Gunnery, Torpedoes, etc.:*

Guns, Naval
Gunpowder
Smokeless Powder
Guncotton
Rapid-fire Guns
Machine Guns
Target Practice
Target
Torpedo
Torpedo Director
Torpedo Net
Rangefinder
Stadimeter
Projectile
Mine, Submarine

(*d*) *Merchant Marine and Allied Subjects:*

Navigation
Merchant Marine (of U. S.)
Ship and Shipping, subheads of:
  Sailing Ship
  Power Navigation
  Classification of Ships for Marine Insurance
  Tables showing tonnage of ships built and building in the merchant navies of the world
Great Eastern
Load-line Marks of Vessels
Measurement of Ships for Tonnage
Safety at Sea
Rules of the Road at Sea
Fog Signals
Coasting Trade
Trade, Board of
Trinity House
Crew
Master
Mate
Pilot

See also the titles grouped under Maritime Law and Navigation on subsequent pages.

SHIPBUILDING AND NAVAL ARCHITECTURE.

The enormous size and great speed of many modern vessels require study, experience, and scientific attainments of the highest class for their design and construction. Under the head of SHIPBUILDING will be found a historical sketch of the subject, a description of the theory of design, of the means and methods of hull construction, and of the design, development, and construction of propelling and other machinery. The principal titles under which shipbuilding information is to be found are:

Armor Plate
Ship and Shipping, and subheads
Shipbuilding, and subheads
Launch, Launching
Navigation
Load-line Marks of Vessels
Marine Engineering
Steam Engine
Steam Turbine
Boiler
Buoyancy
Stability
Metacentre
Resistance
Displacement
Tonnage
Measurement of Ships for Tonnage
Lloyds
A 1

The various parts of a vessel are almost infinite in number. The articles SHIPBUILDING and SHIP will tell of these various parts and describe how the skill of naval architect, marine engineer, and shipbuilder unites them into one congruous whole. Such parts, however, often possess distinct features and characteristics which need separate treatment, and these are included in the following list:

Beak
Bilge
Beam
Bottom
Bow
Bridge
Bulkhead
Bulwark
Cockpit
Cofferdam
Companion

Deck
Figurehead
Gangway
Hawse
Helm
Hold
Keel
Keelson
Paddle-Wheel
Poop
Screw Propeller
Smokepipe

To gain a good idea of the rigging of a ship and the names of masts, sails, etc., the best plan is to consult the plate accompanying the article SHIP, where all the various parts of the rigging of a full-rigged ship are indicated and specified. There are various topics connected with sails and rigging that are described and their functions shown in brief articles. Such a list includes the following:

Belay
Block
Boom
Bowsprit
Brace
Brail
Bridle
Burton
Clip Hooks
Cordage
Crow's-Nest
Davit
Gaff
Halliards
Jib
Jury
Knotting and Splicing
Lateen Sail
Lug-Sail
Mast
Purchase
Rigging
Sail
Spanker
Spinnaker
Sprit
Stay
Tackle

Connected with the ship, but not wholly falling in any of the above classes, are many essentials such as the ANCHOR, the BINNACLE, the DAVIT, etc. These adjuncts are specially designed for specific purposes, which the reader naturally desires to understand. The following list includes some of the more important subjects in such a grouping:

Anchor
Ballast
Batten
Bells
Binnacle
Block
Boiler
Boiler (under Shipbuilding)
Bridle
Buoy
Burton
Cable
Canvas
Capstan
Cat
Cofferdam
Compass
Controller
Cordage
Davit
Fender
Ground-Tackle
Mooring Swivel
Kedge
Knotting and Splicing

Lifeboat
Life Buoy
Life-Preservers
Life-Rafts
Life-Saving Guns and Rockets
Life-Saving Service
Lights
Marling Spike
Oakum
Purchase
Rope
Smokepipe
Stopper
Tackle
Wheel
Winch
Windlass

NAVIGATION.

Navigation involves the conducting of a vessel from one port to another by making use of charts, the position of various heavenly bodies as determined by the navigator, and such other data as he can obtain by observation and calculation. In general this is contained in the article NAVIGATION, but further details and explanations are given of incidental topics. The following list will be found by the reader sufficiently comprehensive:

Navigation
Latitude and Longitude
Sailings
Binnacle
Compass
Log
Reckoning
Dead Reckoning
Day's Work
Departure
Deviation
Fog Signals
Rules of the Road at Sea
Safety at Sea
Rhumb Line
Meridian
Map
Loxodrome
Chart
Hydrography
Meteorology, Marine
Sound, Sounding
Coast Pilot
Bowditch's Practical Navigator
Almanac
Nautical Almanac
Ephemeris
Pilot Chart
Protractor
Sextant
Quadrant
Vernier

SEAMANSHIP.

Seamanship may be distinguished from navigation as dealing with the actual practice, rather than the theory, involving the handling of vessels and the means taken to insure their safety. Thus, under this head, is discussed such important subjects as the RULES OF THE ROAD, the use of the LOG, TACKING, jibing, mooring, and the various manœuvres and operations carried on at sea and in port. These hardly fall in a logical order, but the more important are contained in the following list:

Tacking and Wearing
Jibe
Boxhauling
Lee
Leeway
Moor, Mooring
Log
Log-Book
Helm

Steering
Port
Larboard
Starboard
Bearing
Sound, Sounding

MARITIME LAW.

Vessels sailing on the high seas are governed by rules and usages which have given rise to a body of laws known as admiralty and maritime law. Furthermore, such vessels are required to observe the statutes of the countries whose flags they fly, and such formalities as are duly prescribed. Connected with such governmental regulations are those of marine underwriters and insurance principles, forming a large department of maritime law. Interests at sea are also considered by international law, and prizes and privateering are subjects which it must consider. A grouping of interesting topics in these more or less related branches is as follows:

International Law
Admiralty Law
Maritime Law
Navigation Laws
Navigation, Freedom of
Ship's Papers
Manifest
Bill of Lading
Clearance
Bill of Health
Charter-Party
Cargo
Freight
Demurrage
Admiralty, The
Bounty
Collisions of Vessels
Bottomry Bond
Respondentia
Salvage
Derelict
Wharfage
Jettison
Barratry
Quarantine
Marine Insurance
Lloyds
A 1
Measurement of Ships for Tonnage
Tonnage
Load-line Marks of Vessels
Privateering
Prize
Prize Courts
Desertion
Safety at Sea

As the sailor must make his base of operations on shore, it is proper to consider such subjects as NAVY YARDS, DOCKS, etc., where he may secure supplies and protection. The following list indicates certain articles that will be of assistance in this respect:

Navy Yard
Dockyards, Royal
Arsenal
Reef
Harbor
Breakwater
Dock
Wharf
Torpedo Station
Naval Academy

Chapter 31. The Great War

THE WAR IN EUROPE is treated in an article that has been written by some of the best experts obtainable, and is a complete history of it in all its phases. It is divided into the following subdivisions: I, Underlying Causes; II, Outbreak of the War; III, Military Operations; IV, Western Front; V, Eastern Front; VI, Italian Front; VII, Balkan Front; VIII, Rumanian Front; IX, Turkish Front including the Gallipoli and the Palestine Campaigns; X, Seizure of German Colonies; XI, Naval Operations; and XII, Aërial Operations. This chapter aims to supplement the cross-references in the article on the War printed in volume 25 with a list of related articles in the NEW INTERNATIONAL ENCYCLOPÆDIA.

On June 28, 1914, Archduke Francis Ferdinand, the Austrian heir apparent, was assassinated with his wife at Sarajevo, the capital of Bosnia. This was the match that touched off the conflagration which had been brewing in Europe for years. Austria-Hungary, accusing Servia of complicity in the affair and declaring that it was the Serb aim to secure the provinces of Bosnia and Herzegovina, sent an ultimatum to Servia on July 23. Servia's reply, delivered just before the expiration of the time limit, only partially complied with Austria-Hungary's demands. Despite the most strenuous efforts on the part of the larger countries of Europe, Austria-Hungary declared war on Servia on July 28. Russia, the champion of the Slav Balkan States, issued an order of mobilization and, upon the refusal to withdraw this order, Germany declared war on her. This turned all Europe into an armed camp. France and England came to the aid of Russia, and Germany stood by her ally, Austria-Hungary. Italy, claiming that her Alliance with Germany and Austria-Hungary was purely defensive and claiming further that Austria-Hungary's declaration of war on Servia was offensive, refused to join her partners in the Triple Alliance. Rumania joined the Entente in August, 1916, and, as a result of the unrestricted submarine warfare announced by Germany on January 31, 1917, the United States declared war against her on April 6, 1917. A list of additional belligerents is given in the section, OUTBREAK OF THE WAR.

I. Underlying Causes

The Underlying Causes of the Great War fall naturally under three heads, namely: (1) National Antagonisms, (2) Militarism, and (3) Economic Rivalry.

1. NATIONAL ANTAGONISM.

The problem of national antagonism was an outgrowth of the Congress of Vienna, which concluded the French Revolution and Napoleonic periods. At this Congress many of the diplomats hoped that the principles of the French Revolution would be recognized and that the ruling ideas would be the recognition of the growth of democracy and the realization of national liberty. Because of the opposition of the reactionaries, particularly Metternich, these

ideas were subjugated and the attempt was made to restore the *ancient régime.* Thus we find the problem of nationality cropping up continually in the nineteenth century. Two examples of this will suffice to show the truth of this statement. As a result of the FRANCO-GERMAN WAR, Germany annexed Alsace and Lorraine, French-speaking territories. At the CONGRESS OF BERLIN, Russia's hopes of making the Balkan peninsula a Slav sphere of influence were frustrated by the jealousy of the other European powers. The French consequently hoped for the day of restoration and the national awaking of Russia foreshadowed her expansion to the Mediterranean. If the principle of nationality had been strictly carried out under the Treaty of St. Germain, July, 1920, the dismemberment of the former Austro-Hungarian Empire would have been on a different basis. Consult in volumes 24 and 25 LEAGUE OF NATIONS, PEACE CONFERENCE AND TREATIES, and RACIAL MINORITIES TREATIES.

Consult the following list of articles for a history of the growth of national antagonisms since the beginning of the nineteenth century:

French Revolution
Napoleon I
Peninsula War
Tugenbund
Vienna, Congress of
Alexander I (Russia)
Charles XIV John (Sweden)
Stewart, Robert (Second Marquis of Londonderry, Castlereagh)
Wellington, A. W.
Hardenberg, K. A.
Humboldt, K. W.
Metternich, C. W. N. L.
Nesselrode, K. R.
Stein, H. F. K.
Talleyrand-Perigord, C. M.
Crimean War
Declaration of Paris
Paris, Treaties of
Seven Weeks' War
Schleswig-Holstein
Bismarck-Schönhausen, K. O. E. L.
William I (Germany)
William II (Germany)
Franco-German War
Alsace
Lorraine
Benedetti, Vincent
Napoleon III
Cavour
Mazzini
Garibaldi
Eastern Question
Russo-Turkish War
Berlin, Congress of
Pan Slavism
Pan-Germanism (under War in Europe)
Africa
Turco-Italian War
Balkan War

In order to learn the part played by individual countries during the nineteenth and early twentieth centuries, as well as to find important historical material bearing on national antagonisms, consult the historical sections of the following titles both in the ENCYCLOPÆDIA proper and in volumes 24 and 25 containing more recent supplementary material:

Albania
Austria-Hungary
Belgium
Bosnia
Bulgaria
Denmark

France
Germany
Greece
Herzegovina
Italy
Montenegro
Netherlands
Norway
Poland
Portugal
Rumania
Russia
Sardinia
Servia
Sicilies, Kingdom of the Two
Spain
Switzerland
Turkey
United Kingdom of Great Britain and Ireland

For the biographies of statesmen, soldiers, etc., prominent during the war see the treatment of the countries involved in Chapter I of the Reading Courses. Supplementary to the lists given there are the biographies of individuals mentioned in the War articles, which are given in volumes 24 and 25.

2. Militarism.

Militarism, as defined in the New International Encyclopædia, is "A term employed somewhat loosely to designate a tendency to subordinate civil to military considerations in the policy of the State." We find that all the powers of Europe illustrate this tendency to a greater or less degree. Each has watched any move by the other and attempted to meet any increase in armament by a similar increase. For example, when Germany increased her army in 1913, France passed a law changing the term of service to 3 years, because her slowly increasing population would not permit an outright increase. To appreciate the modern tendency, consult the sections on Armies and Navies in the articles on the more important countries in the Encyclopædia proper and in volumes 24 and 25, as well as the following general titles:

Militarism
Armies
Navies
Military Education
Imperialism
Industrialism
Peace Movement, International

3. Economic Rivalry.

For the economic causes of the war it is not necessary to go back further than the beginning of the nineteenth century. Then occurred the Industrial Revolution, which substituted the factory system of manufacture for the cottage sysem. It also introduced the problem of capital and labor. With the vast increase in production, it was only natural that European countries should look for a market for their goods commensurate with the output. England had a monopoly of manufactures for almost three quarters of a century. Then France, Germany, etc., felt the effects of the revolution and began to look for their "places in the sun." The chief form taken by this economic rivalry was colonization and preferential tariffs. Africa and Asia were partitioned, practically between France and England, thus leaving Germany with no desirable place of expansion. Germany maintained that the adoption of preferential tariffs by the British colonies were attempts to crip-

Pinsk
Poland
Przasnysz
Przemysl
Rzeszów
Saint Petersburg
Sambor
Shavli
Siedlce
Silesia
Stanislau
Stryj
Suczawa
Suvalky
Tannenburg
Tarnopol
Tarnow
Thorn
Tilsit
Tomaszow
Transylvania
Vilna
Warsaw
Wieliczka

(*c*) *Southern Front:*

Mostar
Pirot
Pola
Pozarévatz
Prisrend
Roveredo
Saloniki
Scutari
Semendria
Senlis
Sarajevo
Shabatz
Tyrol
Udine
Uskop

(*d*) *Southeastern Front:*

Kars
Khopa
Suez Canal
Tabriz
Transcaucasia
Urumia
Van

(*e*) *Colonies:*

German East Africa
German Southwest Africa
Kiaochow
Tahiti
Union of South Africa
Windhoek

III. Naval Operations

The naval operations during the Great War took place on almost every known sea. Engagements between flects were comparatively scarce, until the great battle off Jutland. This engagement, with those off the coast of Chile and near the Falkland Islands, were the most important fleet activities. Outstanding features of the naval operations were the submarine warfare, the spectacular raids on merchantmen, the blockade of Germany and the transportation of large numbers of troops from one place to another by the Allies. This section of the article is divided into the following divisions:

Operations in the North Sea and the Waters about Great Britain
Operations in the Baltic
Operations in the Mediterranean
Operations in the Black Sea and Dardenelles
Cruiser Operations in the Atlantic, Pacific and Indian Oceans

Reference should be made to the following articles in volumes 24 and 25:

Navies of the World
Vessels, Naval
Navigation
Gunnery, Naval
Guns, Naval

For a complete list of the more important articles in the NEW INTERNATIONAL ENCYCLOPÆDIA dealing with naval science, see chapter 30 in this volume. See also section on *Navies* of the different countries:

Navies
Battleship
Ship, Armored
Torpedo Boat
Tactics, Naval
Target Practice, Naval
Naval Aëronautics
Naval Reserve
Naval Schools of Instruction
Naval Stores
Hartlepool
Helgoland
Kaiserwilhelmsland
Keeling Islands
Kiaochow
Kiel
Libau
Lissa
Marshall Islands
Memel
New Guinea
Odessa
Ragusa
Reval
Samoan Islands
Scarborough
Sebastopol
Solomon Islands
Togoland
Trebizond
Varna
Yarmouth

IV. Aerial Operations

For the first time in history, aërial operations played an important rôle in warfare. The aërial section of the WAR IN EUROPE article tells the different use to which the different types of aircraft were put. Consult also articles AËRONAUTICS in volume 24, chapter 17 in this volume dealing with AËRONAUTICS in general, and see:

Aëronautics
Navigation, Aërial Law of
Military Aëronautics
Naval Aëronautics
Hangar
London
Paris
Saarbrücken
Sandringham
Treves
Trieste
Venice
Verona

V. Neutral Nations

As the war developed it became almost as difficult for a neutral to maintain an attitude of strict neutrality as it was to be a belligerent. The trade markets of the world were completely upset and all routes and methods of transportation changed entirely. Commerce carrying vessels of the bel-

ligerents were requisitioned for war purposes, and in many neutral countries also political, as well as economical, disturbances resulted. The destruction of neutral vessels, the seizure of neutral mails, etc., brought forth protests from many neutral nations. Besides the historical sections of the neutral nations, such as Switzerland, Norway, Sweden, the Netherlands, see:

International Law
Neutrality
Armed Neutrality
Blockade
Contraband of War
Declaration of Paris
London, Declaration of

VI. Financial and Economic Aspects

The problem of financing the Great War proved to be extremely difficult. With trade and industry all but at a standstill, the usual channels for borrowing money were closed. War taxes of all descriptions were levied and old taxes were greatly increased. Large loans were sought at home and abroad. A large joint loan floated in the United States by the Entente Allies was followed by various national loans secured by undoubted collateral, as well as by the resources of the respective governments. The following list includes the more important articles which deal with financing a war:

Tax
Moratorium
Credit
Rediscounting
Stock Exchange
Bonds
Stocks
Panic, Financial
Crisis, Economic
Money
Marine Insurance
Bank, Banking
Foreign Money

In addition to the foregoing there will be found in volumes 24 and 25 articles on FINANCE AND BANKING, REPARATIONS, and TAXATION IN THE UNITED STATES, in which are discussed not only the problems of war finances and economics, but also the developments which followed the Armistice and continued to be matters of vital interest. The War also involved elaborate measures of RELIEF ADMINISTRATION discussed under that head, as well as under BELGIUM, where will be described the activity of the Commission for Relief in Belgium.

Chapter 32. Medicine

THE dissemination of some medical knowledge among the laity is a matter of inestimable social importance. Popular ignorance on the subjects of hygiene, the prevention of disease, and the care of the sick, places many widespread evils sadly beyond the power of the medical profession. The average man's failure, moreover, to appreciate clearly the soundness of the principles and methods of medical science invites the appearance in the community of various mystical, or mystifying, quacks, claiming to know therapeutic methods of all but miraculous efficiency, and offering to sell medicines which, like the philosopher's stone once vainly sought by the alchemists, possess unlimited curative powers. Honest and valuable knowledge to-day has no secrets, and, notwithstanding, or rather because of, really considerable development, is professedly aware of its limitations. Perhaps, therefore, the clearest mark of the impostor or incompetent is the alleged possession of secrets or of methods of universal applicability. Nor will the cunning theories, widely advertised in support of such allegations, appear at all reasonable to the man who has familiarized himself with the main principles and facts of scientific—that is, rational—medicine.

The lists of articles presented in the following pages map out a complete course of systematic reading in medicine. A true understanding of the purely medical subjects, even in their elementary aspects, is possible only after the acquisition of some knowledge of the general biological sciences and of chemistry. Thus, human anatomy is best understood if studied in connection with comparative anatomy. Physiology is more or less obscure if studied without a preliminary knowledge of the general principles of chemistry and biology, and, again, human physiology should be studied in connection with the physiology of the lower animals. Even general botany presents a number of points of the highest interest to the student of human anatomy and physiology. Should the assiduous reader of the Encyclopædia desire to familiarize himself with these and cognate subjects, the present volume will readily afford the necessary guidance. We would especially call attention to the psychological articles on the special senses and faculties, without which the physiological functions of the brain and nervous system cannot be thoroughly understood. Further, a large number of chemico-physiological articles on special foods, and of articles on subjects of veterinary medicine, will be found listed in the chapter Agriculture, Horticulture, and Forestry, those articles having been prepared for the Encyclopædia by the food and veterinary experts of the United States Department of Agriculture.

The classification of the medical subjects proper, on which the lists below are based, and the order of sequence of the subjects in the lists themselves, are those adopted by the best medical authorities, with slight modifications to suit the distribution of subject-matter in the Encyclopædia. The only considerable deviations from general usage are in the case of anatomy and physiology, the two being somewhat closely interwoven in the Encyclopædia and therefore, here, too, arranged as one joint subject. The listed articles comprise a complete

treatment of essentials. The reader desiring more detailed information on particular bones, muscles, nerves, etc., will be guided to the special articles on such subjects by cross-references in the articles listed.

The only lists in which the order of sequence of the topics is not according to some recognized system are those under "Symptoms and Morbid Conditions" (division, Pathology and Therapeutics) and "Diseases of the Skin" (division, Diseases of the Nose and Throat, Ear, Eye, Skin, and the Genito-Urinary System). The former list comprises those symptoms and morbid conditions that are common to more than one class of diseases and that could not, therefore, be included in the somewhat rigidly classified lists preceding. On the other hand, the orders of sequence of skin diseases usually adopted in special medical works are practically useless. It was, therefore, deemed best in both cases to preserve the alphabetical order—for convenience of reference. The list of "Drugs" (division, Materia Medica) includes all the pharmacopœial preparations in frequent use. A number of rarer drugs may be found described in the articles on chemical subjects.

The biographies of famous medical men are arranged in the order of historical sequence and, together with the articles listed under "History," form a complete presentation of the history of medicine—a truly fascinating subject. Interesting historical detail will also be found in the articles on all medical topics of any importance. The inclusion of such historical articles as BATH, BARBER, EMPIRIC, DERIVATION, BLACK DEATH, PLAGUE, INOCULATION, etc., would have swelled the lists unnecessarily.

1. INTRODUCTORY ARTICLES.

Medical Education
Homœopathy
Eclectic School of Medicine
Nurses, Training of
Clinic
Hospital
Dispensary
Ambulance
Insane Asylum
Bedlam
Gheel
Epileptic Colony
Vital Statistics
Sanitary Laws
Health, Boards of
Contagious Diseases
Hippocratic Oath
Medical Code
Malpractice
Medicine

II. ANATOMY AND PHYSIOLOGY.

1. *General Articles:*

Anatomy
Physiology

2. *Bones, Muscles, and Ligaments:*

Bone
Cartilage
Marrow
Periosteum
Suture
Ossification
Skeleton
Skull
Spinal Column
Rib
Sternum

Muscle and Muscular Tissue
Tendon
Ligament
Flesh
Muscular Force
Diaphragm
Joint
Shoulder-Joint
Arm
Hand
Hip-Joint
Thigh
Knee-Joint
Patella
Leg
Foot

3. *Cavities:*
Skull
Chest
Abdomen
Pelvis

4. *Nervous System and Brain:*
Nervous System and Brain
Cerebro-Spinal Fluid
Inhibition

5. *Circulatory System:*
Circulation
Heart
Vein
Artery
Pulse
Aorta
Innominate Artery
Carotid Artery
Iliac Arteries
Blood
Blushing

6. *Respiratory System:*
Respiration, Organs and Process of
Pharynx
Larynx
Voice
Trachea
Bronchus
Asphyxia

7. *Alimentary System:*
Alimentary System
Digestion, Organs and Processes of
Food
Nutrition
Teeth
Pharynx
Salivary Gland
Œsophagus
Stomach
Pepsin
Intestine
Peristaltic Motion
Pancreas
Pancreatin
Liver
Bile
Brunner's Glands
Absorption
Colon
Cæcum
Vermiform Appendix
Rectum
Anus
Fæces

8. *Genito-Urinary System.*
Puberty
Menstruation
Climacteric Year
Reproduction
Ovary
Fallopian Tubes
Uterus
Vagina
Bartholin's Glands
Breast
Kidney
Ureter
Bladder

Urethra
Urine

9. *Special Senses:*
Nose
Eye
Ear
Tongue
Touch

10. *Ductless Glands and Lymphatic Structures:*
Thyroid Gland
Thymus Gland
Suprarenal Capsules
Pituitary Body
Spleen
Tonsil
Lymphatic
Thoracic Duct
Lacteal
Chyle
Lymph

11. *Tissues:*
Histology
Epithelium
Gland
Skin
Hair
Sweat
Nail
Scalp
Membrane
Mucous Membrane
Connective Tissue
Adipose Tissue
Endothelium
Serous Membrane
Pericardium
Pleura
Mesentery
Peritoneum
Periosteum
Muscle and Muscular Tissue
Nervous System and Brain

12. *Embryology:*
Embryology, Human
Epigenesis
Embryo
Fœtus

13. *Physiological Subjects not included Above:*
Chemistry, Physiological
Life, Mean Duration of
Rigor Mortis
Longevity
Metabolism
Animal Heat
Temperature of the Body
Sleep
Hypnoscope
Sex
Sensation
Secretion
Vivisection
Vegetarianism

III. Hygiene and Prophylactic Methods.
Hygiene
Sanitary Laws
Sanitary Science
Health
Immunity
Quarantine
Disinfectants
Heating and Ventilation
Water Supply
Water Purification
Sewage Disposal
Food
Diet
Infants, Feeding of
Wine
Sterilized Food
Exercise
Physical Training
Bath
Vaccination

IV. Pathology and Therapeutics.

1. *General Articles:*

Pathology
Therapeutics
Disease
Nosology
Disease, Germ Theory of
Distribution of Diseases
Congenital Disease
Degeneration
Intermarriage
Filth Disease
Occupational Diseases
Endemic
Epidemic
Infection
Insects, Propagation of Disease by
Bacteria
Microscopy, Clinical
Toxin
Virus
Homœopathy
Eclectic School of Medicine
Christian Science
Osteopathy
Leeching

2. *Specific Infectious Diseases:*

Typhoid Fever
Relapsing Fever
Smallpox
Chicken Pox
Scarlet Fever
Measles
Mumps
Whooping Cough
Influenza
Dengué
Meningitis
Erysipelas
Diphtheria
Croup
Septicæmia
Poliomyelitis
Cholera
Yellow Fever
Black Vomit
Plague
Dysentery
Malaria and Malarial Fever
Ague
Jungle Fever
Malignant Pustule
Anthrax
Intermittent Fever
Remittent Fever
Hydrophobia
Tetanus
Trismus Nascentium
Syphilis
Tuberculosis
Scrofula
Glanders
Actinomycosis
Febricula
Malta Fever

3. *Constitutional Diseases:*

Rheumatism
Lumbago
Gout
Diabetes
Rickets
Scurvy
Purpura
Hæmophilia
Obesity

4. *Diseases of the Alimentary System:*

Mouth, Diseases of the
Aphthæ
Pharyngitis
Quinsy
Œsophagus
Stomach, Diseases of the
Gastritis
Dyspepsia

Indigestion
Enteritis
Gastro-Enteritis
Cholera Infantum
Mesentery
Liver, Diseases of the

5. *Diseases of the Respiratory System:*

Rhinitis
Hay Fever
Laryngitis
Bronchitis
Asthma
Tuberculosis
Pneumonia
Pleurisy
Hydrothorax

6. *Diseases of the Circulatory System:*

Heart, Diseases of the
Pericarditis
Endocarditis
Myocarditis
Palpitation
Angina Pectoris
Atheroma
Arterio-Sclerosis

7. *Diseases of the Blood and Ductless Glands:*

Anæmia
Chlorosis
Leucocythæmia
Goitre
Cretinism
Myxœdema
Basedow's Disease
Acromegaly
Addison's Disease

8. *Diseases of the Kidneys:*

Kidney, Diseases of the
Bright's Disease
Uræmia

9. *Diseases of the Nervous System and Brain:*

Neurology
Nervous Disease
Nervousness
Paralysis
Neuritis
Sciatica
Facial Paralysis
Caisson Disease
Myelitis
Locomotor Ataxia
Syringomyelia
Brain, Diseases of the
Aphasia
Apoplexy
Hemiplegia
Hydrocephalus
Paralysis Agitans
Chorea
Epilepsy
Hystero-Epilepsy
Migraine
Neuralgia
Facial Neuralgia
Neurosis
Hysteria
Sea-Sickness
Neurasthenia
Hypochondriasis
Rest-Cure
Acromegaly
Stammering
Nostalgia
Fatuity
Imbecility
Idiocy
Insanity
Delirium
Dipsomania
Melancholia
Mania
Paranoia
Pellagra

Monomania
Pyromania
Kleptomania
Homicidal Mania
Puerperal Insanity
Paresis
Lucid Interval
Imitative Insanity

10. *Parasitic Diseases:*

Parasitic Diseases
Worms
Oxyuris
Trichiniasis
Sleeping-Sickness
Filaria
Lumbricoid
Tapeworm

11. *Symptoms and Morbid Conditions:*

Albuminuria
Amblyopia
Amenorrhœa
Anosmia
Aphonia
Arcus Senilis
Asthenopia
Bedsores
Breath, Offensive
Cachexia
Catalepsy
Catarrh
Colic
Coma
Congestion
Constipation
Convulsion
Coughing
Cramp
Crisis
Cyanosis
Degeneration
Diarrhœa
Dropsy
Ecchymosis
Embolism
Epistaxis
Fainting
Fatty Degeneration
Fever
Formication
Hæmaturia
Hæmoptysis
Headache
Heat-Stroke
Hectic Fever
Hemiopia
Hiccough
Hyperæsthesia
Hypertrophy
Insomnia
Jaundice
Knee-Jerk
Leucorrhœa
Locomotor Ataxia
Muscæ Volitantes
Nausea
Œdema
Osteomalacia
Oxaluria
Papule
Pectoriloquy
Petechia
Pleurodynia
Polydipsia
Pulse
Purpura
Pyrosis
Respiratory Sounds
Senility
Sitophobia
Skin Disease
Spasm
Starvation
Sweat
Symptom
Tenesmus
Thirst

Tinnitus Aurium
Urine, Incontinence of
Vertigo
Vomiting
Waxy, or Amyloid Degeneration

12. *Diagnostic and Therapeutic Methods and Instruments:*

Diagnosis
Percussion
Auscultation
Stethoscope
Dynamometer
Axillary Thermometer
Temperature of the Body
X-Rays
Microscopy, Clinical
Laryngoscope
Ophthalmoscope
Therapeutics
Diet
Exercise
Movement Cure
Hydrotherapy
Massage
Rest-Cure
Transfusion of Blood
Venesection
Radium

V. SURGERY, GYNÆCOLOGY, AND OBSTETRICS.

1. *General Articles:*

Surgery
Surgery, Military
Obstetrics

2. *General Surgical Pathology:*

Inflammation
Suppuration
Pus
Abscess
Boil
Felon
Carbuncle
Ulcer
Phagedena
Sinus
Fistula
Necrosis
Gangrene
Caries
Adhesion
Cicatrization
Bruise
Wound
Gunshot Wound
Dissection Wounds
Burns and Scalds
Frostbite
Tumor
Cyst
Hydatid
Actinomycosis
Adenitis
Septicæmia
Pyæmia
Shock

3. *General Surgical Technique:*

Anæsthesia
Antiseptic
Acupressure
Acupuncture
Bleeding
Drainage Tubes
Ligature
Suture
Tourniquet
Puerperal Fever
Abortion
Forceps
Embryotomy
Cæsarean, or Cæsarian, Operation
Leeching
Electricity, Medical Uses of
Compressed-Air Treatment
Respiration, Artificial
Resuscitation
Stomach-Pump
Cupping

Organotherapy
Serum Therapy
Antitoxin
Tuberculin
Hypnotism
Hypodermic Medication

4. *Pathology of Special Structures:*
Artery
Aneurism
Phlebitis
Varicose Vein
Thrombosis
Embolism
Nerve-Stretching
Fracture
Callus
Osteomyelitis
Periostitis
Splint
Amputation
Sprain
Synovitis
Arthritis
Housemaid's Knee
Ankylosis
Dislocation
Resection
Wen
Keloid
Chapped Hands
Bunion
Corn
Skin-Grafting

5. *Orthopædic Surgery:*
Deformities
Wry-Neck
Pott's Disease
Spine, Curvature of the
Hip-Joint
Knock-Knee
Leg
Valgus
Varus
Clubfoot
Tenotomy
Artificial Limbs

6. *Regional Surgery, Including Gynæcology:*
Encephalocele
Concussion of the Brain
Trephine, Trephining
Rhinoplastic Operation
Harelip
Ranula
Dentistry
Laryngotomy
Tracheotomy
Choking
Mammary Gland, Diseases of
Rib, Fracture of the
Pleurisy
Empyema
Peritonitis
Gastrostomy
Umbilical Hernia
Hernia
Truss
Intussusception
Laparotomy
Vermiform Appendix
Perityphlitis
Ovary
Nephrotomy
Nephrectomy
Calculus, or Stone
Lithotrity
Lithotomy
Castration
Rectum, Diseases of the
Prolapsus Ani
Piles
Spina Bifida
Uterus, Diseases of the
Prolapsus Uteri

7. *Obstetrics:*
Obstetrics
Gestation
Superfœtation and Superfecundation

Placenta
Puerperal Fever
Caul
Umbilical Cord
Meconium
Weaning
Agalactia

VI. Diseases of the Nose and Throat, Ear, Eye, Skin, and the Genito-Urinary System.

1. *Diseases of the Nose and Throat:*
Rhinitis
Epistaxis
Ozena
Polypus
Throat, Affections of the
Larynx, Diseases of the
Laryngitis

2. *Diseases of the Ear:*
Ear
Deafness
Cerumen
Otitis Media
Otorrhœa
Otalgia

3. *Diseases of the Eye:*
Eye, Diseases of the
Blindness
Ectropion
Entropion
Stye
Trichiasis
Conjunctivitis
Ophthalmia
Blepharitis
Cornea
Leucoma
Staphyloma
Iritis
Glaucoma
Cataract
Retinitis
Nyctalopia
Color-Blindness
Optic Neuritis
Sight, Defects of
Myopia
Hyperopia
Astigmatism
Heterophoria
Strabismus

4. *Diseases of the Skin:*
Acarus Folliculorum
Acne
Alopecia
Bromidrosis
Corn
Ecthyma
Eczema
Erythema
Favus
Hair
Ichthyosis
Impetigo
Itch
Leprosy
Lichen
Lupus
Nævus
Pemphigus
Pityriasis
Plica
Prurigo
Psoriasis
Ringworm
Rupia
Seborrhœa
Sycosis
Tinea
Vitiligo
Wart
Yaws

5. *Diseases of the Genito-Urinary System:*
Cystitis
Calculus, or Stone
Extravasation

Prostate Gland
Gonorrhœa
Stricture
Hydrocele
Varicocele
Syphilis
Circumcision

VII. Materia Medica.

1. *General Articles:*

Materia Medica
Pharmacopœia
Toxicology
Prescription

2. *Preparation of Drugs:*

Tincture
Pill
Liniment
Lotion
Plasters
Infusion
Extract
Percolation
Suppository
Unguent
Ointment
Elixir

3. *Classification of Drugs:*

Alterative
Tonic
Excitant
Narcotics
Sedatives
Hypnotics
Anæsthetic
Anodyne
Antipyretic
Febrifuge
Expectorant
Stimulants
Gargle
Emetics
Anti-Emetic
Bitters
Antacids
Carminatives
Cholagogue
Laxative
Purgatives
Cathartic
Hydragogues
Anthelmintic
Diuretics
Diaphoretics
Anhidrotics
Antispasmodic
Astringents
Demulcents
Diluents
Aphrodisiac
Anaphrodisiacs
Emmenagogues
Oxytocics
Irritant
Rubefacients
Refrigerants
Depilatories
Disinfectants
Poison
Antidote

4. *Drugs:*

Quinine
Mercury, Medicinal uses of
Iodine
Iodides
Bromides
Arsenic
Iron
Colchicum
Colchicine
Salicylic Acid
Salicylates, Medical Uses of the
Salicin
Sulphur, Medical Uses of
Fern, Male
Kamala
Santonin
Goa Powder

Chrysarobin
Phosphorus
Alcohol, Pharmacology, Toxicology, and Therapeutic Use
Absinthe
Hashish
Opium
Laudanum
Paregoric
Dover's Powder
Morphine
Chloral
Paraldehyde
Hypnal
Sulphonal
Trional
Urethane
Hemlock
Coniine
Curari
Chloroform
Ether, or Di-Ethyl-Ether
Nitrous Oxide
Cocaine
Digitalis
Nux Vomica
Strychnine
Strophanthus
Valerian
Sparteine
Aconite
Hellebore
Veratrine
Tobacco
Amyl Nitrite
Nitroglycerin
Belladonna
Atropine
Homatropine
Sal Ammoniac
Heroin
Guaiacol
Creosotol
Calumba
Sodium
Lime, or Calcium Oxide
Apomorphine
Asafœtida
Senna
Cascara Sagrada
Castor Oil
Blue Pill
Calomel
Rhubarb
Aloes
Seidlitz Powders
Rochelle Salt
Epsom Salt
Jalap
Colocynth
Elaterin
Bismuth
Lead
Lunar Caustic
Diuretin
Copaiba
Methylene Blue
Salol
Jaborandi
Iodoform
Carbolic Acid
Sulphurous Acid
Antipyrine
Phenacetine
Acetanilid
Matzoon
Cod-Liver Oil
Lanolin
Ichthyol
Salvarsan

VIII. HISTORY AND BIOGRAPHY.

1. *History:*

Medicine
Homœopathy
Eclectic School of Medicine
Anatomy
Histology

Physiology
Hygiene
Pathology
Disease, Germ Theory of
Therapeutics
Surgery
Surgery, Military
Obstetrics
Dentistry

2. *Biography:*

Hippocrates
Galen, or Claudius Galenus
Arctæus
Avicenna
Linacre, or Lynaker, Thomas
Paracelsus
Fracastoro, Girolamo
Fallopio, or Fallopius, Gabriel
Vesalius, Andreas
Eustachio, Bartolommeo
Paré, Ambroise
Fabricius, or Fabrizio, Girolamo
Harvey, William
Sydenham, Thomas
Pecquet, Jean
Graaf, Regnier de
Willis, Thomas
Malpighi, Marcello
Radcliffe, John
Leeuwenhoek, Antonius van
Boerhaave, Hermann
Hoffmann, Friedrich
Sloane, Sir Hans
Morgagni, Giovanni Battista
Swieten, Gerard van
Haller, Albrecht von
Pott, Percival
Brown, John
Cullen, William
Hunter, John
Perkins, Elisha
Auenbrugger, von, or Auenbrugg, Leopold
Mesmer, Franz, or Friedrich-Anton
Bell, John
Jenner, Edward
Baillie, Matthew
Pinel, Philippe
Post, Wright
Gall, Franz Joseph
Soemmering, Samuel Thomas von
Scarpa, Antonio
Spurzheim, Johann Kaspar
Hufeland, Christoph Wilhelm
Physick, Philip Syng
Broussais, François Joseph Victor
Ling, Pehr Henrik
Esquirol, Jean Etienne Dominique
Cooper, Sir Astley Paston
Larrey, Dominique Jean
Bell, Sir Charles
Hahnemann, Samuel
Dieffenbach, Johann Friedrich
Wells, Horace
Morton, Samuel George
Priessnitz, Vincenz
Beaumont, William
Orfila, Matthieu Joseph Bonaventure
Graves, Robert James
Ennemoser, Joseph
Magendie, François
Warren, John Collins
Amussat, Jean Zuléma
Hall, Marshall
Bright, Richard
Müller, Johannes
Forbes, Sir John
Francis, John Wakefield
Wagner, Rudolph
Mott, Valentine
Quain, Jones
Lawrence, Sir William

Flourens, Marie Jean Pierre
Goodsir, John
Morton, William Thomas Green
Syme, James
Simpson, Sir James Young
Parrish, Edward
Holland, Sir Henry
Winslow, Forbes (Benignus)
Andral, Gabriel
Rokitansky, Karl, Baron
Bernard, Claude
Peaslee, Edmund Randolph
Long, Crawford W.
Wood, George Bacon
Taylor, Alfred Swaine
Seguin, Edouard Onesimus
Broca, Paul
Sims, James Marion
Parker, Willard
Gross, Samuel D.
Draper, John Christopher
Post, Alfred Charles
Flint, Austin
Kneeland, Samuel
Gray, John Perdue
Quain, Richard
Langenbeck, Bernhard Rudolph von
Parker, Peter
Bright, Richard
Ricord, Philippe
Taylor, Isaac Ebenezer
Owen, Sir Richard
Earle, Pliny
Mackenzie, Sir Morell
Peters, John Charles
Moleschott, Jacob
Charcot, Jean Martin
Brown-Sequard, Charles Edouard
Pasteur, Louis
Tuke, Daniel Hack
Loomis, Alfred Lee
Dubois-Reymond, Emil Heinrich
Kneipp, Sebastian
Lusk, William Thompson
Quain, Sir Richard
Hart, Ernest Abraham
Pepper, William
Seguin, Edward Constant
Paget, Sir James
Taylor, Charles Fayette
Hammond, William Alexander
Virchow, Rudolph
Kussmaul, Adolph
Thomas, Theodore Gaillard
Davis, Nathan Smith
Thompson, Sir Henry
Esmarch, Johannes Friedrich August von
Guernsey, Egbert
Lister, Sir Joseph
Emmet, Thomas Addis
Mitchell, Silas Weir
Jacobi, Abraham
Turner, Sir William
Recklinghausen, Friedrich von
Flint, Austin, Jr.
Smith, Andrew Heermance
Sternberg, George Miller
Carpenter, William Benjamin
Hansen, Gerard Henrik Armauer
Janeway, Edward Gamaliel
King, Albert Freeman Africanus
Wood, Horatio Curtis
Rayleigh, John William Strutt, Baron
Koch, Robert
Laveran, Charles Louis Alphonse
Morton, William James
McBurney, Charles
Trudeau, Edward Livingston
Morselli, Enrico Agostino
Spitzka, Edward Charles
Lorenz, Adolph
Starr, Moses Allen
Horsley, Victor Alexander Haden
Peterson, Frederick
Manson, Patrick

Flexner, Simon
Ehrlich, Paul
Wassermann, August von
Carrel, A.
Sullstrand, Allwar
Tiedemann, Friedrich
Mayo, Charles Horace
Mayo, William James
Richet, C. R.
Kossel, Albrecht
Behring, E. A. von
Ross, Sir R.
Metchnikoff, E.
Ramón y Cajal, S.
Pavlov, I. P.
Finsen, N. R.

Chapter 33. Manners and Customs

Dress and Apparel

NOWHERE more than in the apparel of men and women does time wreak its changes and the spirit of an age stand out. The student of the manners and customs of a people or period often may apply himself with profit to a consideration of their garments, and conversely in a study of the garments reflex actions on the wearer may be observed. Indeed, clothes may be subject to the dictates of a fickle fashion or possess a spiritual and deep-lying significance, as in the case of ecclesiastical vestments, or changing from the decorative to the more serviceable, as in the case of the military or naval uniform.

Thus costume in itself may possess a significance more than merely for the interest of the votary of fashion. For such a student a series of articles might be recommended embraced in the following list:

Costume
Dress
Textiles
Dress Reform
Armor
Fashion
Embroidery
Corset
Crinoline
Girdle
Glove
Hosiery
Mantle
Shawl
Hair Dressing
Beard
Cosmetics
Rouge
Perfumery
Wig
Hat
Headdress
Shoes
Boots
Jewelry
Parasol
Uniforms, Military and Naval
Costume, Ecclesiastical
Degree (for Academic Costume)

Jewelry

Among the minor arts in none have there been more important developments than in the artistic design and fabrication of jewelry. In many fields there may be considered to have taken place within recent years a return to the artistic products of the early gold- and silver-smiths of Continental Europe, while in the cutting and setting of gems there has also been opportunity for the display of the skill of the lapidary and the jeweler, who have evolved new styles of cutting and forms of settings.

Under the broad heading of JEWELRY in this section can be considered the articles for personal adornment, involving the use of precious and semi-

precious stones and the careful working of such metals as gold and silver, and also the manufacture of objects of utility and ornament of a somewhat larger description, such as tableware and the artistically decorated porcelain and other objects of art.

The visitor to a museum of fine arts would often find grouped in a single department such articles as are embraced in the following list, which is submitted for the guidance of the reader:

Jewelry
Fan
Enamel
Embossing
Gems
Goldsmith Work
Inlaying
Lacquer Work
Lapidary Work
Japanese Art
Marquetry
Metal Work
Pearl
Plate
Porcelain
Pottery
Plated Ware
Repousée
Ring
Stained Glass
Table Ware
Tarsia Work
Fork
Cutlery

In connection with jewelry, it is desirable to refer also to the various gems which are used for personal adornment. The article GEMS, which discusses the general qualities of precious or beautiful stones, with particular reference to those cut or engraved for use as jewels or seals, describes the history of such ornaments from the earliest periods of Egypt. This is followed by an article on GEMS, IMITATION AND ARTIFICIAL, in which are discussed the various imitations ranging all the way from crude affairs of glass to modern triumphs of the chemist, involving the electric furnace as a means of producing the gems artificially or synthetically.

While precious stones used for gems may have considerable value, due to their rare occurrence in nature, it is the lapidary who, in his cutting, grinding and polishing the various crystals or other precious stones, adds to their value or even, in some cases, gives beauty and value to stones whose intrinsic value is but small. Accordingly, the article LAPIDARY WORK should be read in addition to that on gems, and then the reader can take up the series of articles on the precious stones themselves—naturally headed by the diamond. These arrange themselves into two groups—those of great rarity and value, as follows:

Diamond
Emerald
Ruby
Sapphire
Amethyst
Opal
Carnelian
Turquoise
Topaz

The second group comprises many, mostly crystalline minerals, that are also considered as precious, but whose rarity is not such as to put them in

the same class with the list just given. Such minor stones would be:

Corundum
Quartz
Beryl
Chrysoberyl
Aquamarine
Tourmaline
Alabaster
Chalcedony
Sardonyx
Argonite
Agate
Jasper
Chrysolite
Garnet
Rhodonite
Chrysocolla
Catlinite

Chapter 34. Games and Sports

ALL peoples indulge in exercises of strength, of skill, of bodily and mental agility, or of fortune, and often these mimic the more serious pursuits of life, or consist in these very pursuits indulged in for pleasurable purposes only.

1. The capture and slaying of animals has remained a source of pleasure long after it has ceased to be the chief business of life. See:

(*a*) Shooting
Archery
Trapping
Coursing
Battue
Tiger-hunting
Still-Hunting
Fox-hunting
Falconry
Game Laws
Game Preserves

(*b*) Angling
Bait-fishing
Salmon-fishing
Trolling
Trout-fishing
Fly-Casting

2. The mimicry of war is also found in contests between men or animals, or men and animals. See:

Pugilism
Boxing
Wrestling
Fencing
Cock-fighting
Bear-baiting
Bull-fight

3. Water, both in its common state and in the forms of ice and snow, furnishes many forms of sport to primitive and civilized man. See:

(*a*) Swimming
Rowing
Canoe and Canoeing
Yachting
Water Polo

(*b*) Skating
Ice Polo
Ice Yachting
Curling

(*c*) Snowshoeing
Skiing

4. Useful to man in labors, the horse is his great companion in numerous sports. See:

Horsemanship
Coaching
Driving
Trotting
Pacing
Horse-racing
Stud-book
Derby Day
Steeple chasing
Polo
Hippodrome

5. Of the instruments entering into popular games, the ball, in various shapes, is by far the most common and the most widespread. See:

Bowls
Baseball
Indoor Baseball
Cricket
Golf
Croquet
Hockey
La Crosse
Polo
Football

Basketball
Handball
Pelota
Racquets
Tennis
Lawn Tennis
Court Tennis
Ping-Pong
Billiards
Bagatelle

6. In games of chance, the card and the die in varying forms are universally found. In the case of cards, however, chance often plays the minor part and the game assumes a highly intellectual character. See:

(*a*) Cards
Whist
Bridge
Pinochle
Skat
Ecarté
Piquet
Bezique
Cribbage
Euchre
Solitaire
Poker
Baccarat
Rouge et Noir
Fan-tan

(*b*) Dice
Hazard
Craps

(*c*) Roulette

7. For the great intellectual games par excellence, see:

Chess
Checkers

and for cognate games:

Backgammon
Dominoes

8. Miscellaneous sports and games:

Cycling
Mountain Climbing
Coasting
Toboggan
Shuffleboard
Quoits

9. The general subject is treated under:

Athletics
Gymnastics
Physical Culture
Amateur
Handicapping
Sports, Book of
Games, Ancient
Gymkhana
Olympic Games
Pythian Games
Nemea
Gladiator
Circus
Acrobat

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